QUALITY OF PAEDIATRIC CARE AT KING EDWARD VIII HOSPITAL

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SUMMARY

The purpose of health service research is to produce knowledge that will contribute to the improvement in the delivery of health care [1] and it is in this spirit that this study of the quality of paediatric care at King Edward VIII Hospital was undertaken.

The main method utilized was an evaluation of aspects of the process of care of selected conditions, as measured against a predefined set of standards. This was accomplished by a retrospective review of patient records. Assessments were also made of the utilization of the Department's services, manpower and equipment. The surveys conducted involved the Outpatient's Department, the General and the Neonatal Wards of the Paediatric Department of the King Edward VIII Hospital, Durban. The Hospital Administration's routine and computerized data were also analyzed.

Among the findings was that the routinely collected data is inadequate, providing only limited information for management purposes. The assertion that the utilization of the Department is high was confirmed, as was the claim that some resources are inadequate to cope with increasing demand. Many factors contribute to this, including high bed occupancy, high patient to doctor ratios, and several factors outside of direct hospital control (primary care services). The general clinical care of patients is high, but particular aspects were found to be in need of attention; for example, the metabolic and fluid management of the ill young patient and medical records in general.

Immediate and long-term recommendations pertaining to the Paediatric Department and the Administration are presented.

INTRODUCTION

In July 1986 a Memorandum was forwarded to the Department of Hospital Services, Natal, from the Department of Paediatrics and Child Health of the University of Natal. The memorandum detailed what was considered to be the " critical situation which has arisen in the children's wards at King Edward VIII Hospital ". Sighting lack of accommodation and lack of medical and nursing staff as the major causes, the memorandum listed several purported consequences, among which were "poor patient care .... resulting in premature discharge of ill children and turning away of many very ill children who require admission .... high morbidity and mortality ".

This study was an attempt to clarify some of these factors in order to make information available for management decisions.

The "quality " of medical care is an important aspect of the evaluation of medical services. It encompasses a wide variety of factors and is therefore difficult to quantify. While the theoretical concepts of evaluation are simple, the practical application is usually difficult. This has limited the implementation of available techniques, because of a fear of not having ' complete ' data to work with. This fact, however, should not lead to the abandonment of attempts to measure quality of care.

There are two sides to the measurement of health care: firstly, quality of care given to the individual patient and, secondly, the aggregation of data to measure the performance of institutions or part of institutions. These principles were perhaps first conceived by Florence Nightingale in 1860 [2]. The general approach is based on formalized peer judgement by medical and nursing staff caring for individual patients, and is input for management purposes.

Quality of care measures are necessary although often complicated procedures: the medical specialist can make professional decisions without the administrators, but the administrators must depend upon professional criteria of success or failure in order to make their decisions. Without this input, total resource management is not possible [3].

Inquiry into medical care (institutional or otherwise) is in its' infancy in South Africa and only a matter of fifty years old worldwide. Most often it has been limited to the evaluation of medications or procedures. In the United States of America (USA), the emphasis on privatization lead to the

development of hospital accreditation, a move away from pure monitoring of individuals toward interpretation of data based on institutions, diseases and other grouped sources. This was not carried out by direct comparison between one hospital and another, but rather by comparing the relative compliance of an institution with a set of pre-determined performance criteria. While the system was started within the profession, the USA government was quick to adopt the mechanism as a useful indicator. *These methods may well be the only interface between clinical epidemiology and the quality control of delivery of medical care* [4].

Measurement of quality is set to become the central issue in cost containment and planning. The rapid, expensive development of medical technology and the growth of the private medical industry, coupled with medical aid schemes, necessitates the development of means of measuring and evaluating demand and supply. Both the purchases and providers of care are becoming increasingly aware of the cost of health. In the United States this has developed further into full public accountability for many quality of care factors, including education of medical personnel, evaluation of facilities and services, and cost control strategies. Another important issue there is that of malpractice litigation. This is still a major factor [5], accounting for millions of dollars in insurance.

There is no one method to answer these diverse requirements. There are many approaches, including operational research models [6] and the development of indicators [7] [8], but the most commonly used can be classified into measurements of input and structure, measurements of output or end results (outcome), and measurements of the patient care process [9] [10].

Input measurements are the most widely used, concerning such factors as the number of staff per bed, beds per catchment population, provision and maintenance of equipment, education and supervision of personnel and the completeness of patients' medical records. The reasoning behind the approach is that if enough well trained staff are available to work in well equipped institutions, keeping adequate records and reviewing these records, then this must lead to a high quality of care. This is certainly not always the case. Whilst the method is relatively easy to implement, it must be based on defined norms in many cases, the determination of which is fraught with problems. It does, however, enable a suitable basic level of care to be provided. Perhaps the major impact is that if fully developed, it mandates the keeping of complete and accurate records which can be used for newer approaches at a later date.

Output measurements are more limited in scope, providing the end results of a procedure or procedures on individual patients (a summary as an indication of the quality of care). While they are useful for a single period in time for the institution, unless adjusted for changes in the community served and within the institution itself, are not useful for comparison. The use of these methods, however, has changed significantly, to try to cater for some of the inherent problems; for example, by examining case fatality rates. But then this narrows down their application even further.

The third approach is that of measuring how patients are actually treated, and comparing this to criteria derived from the professions themselves. By basing the measurement on the medical record, it enables the method to be applied in a much wider perspective, including practice outside of hospitals, and in the private and public sectors alike. Firstly, specific diagnostic conditions or groups of conditions are chosen. Criteria of care are then established: these would be those considered to be critical to the policies governing admission, diagnosis, investigations, discharge and length of stay characteristics. The aggregated results could be utilized in several ways; for example, identification of individual patients who did not conform to the standards, or rated for individual doctors, wards or for institutions as a whole. By constructing the system to allow an assessor merely to mark the presence or absence of the particular criteria in the medical record, it could enable well trained clerical personnel (medical records, nursing staff) to scan many records. The aggregated results would then allow the assessor to identify specific records / departments for in-depth review. These factors can then be correlated with patient loads, patient case mix and other factors which are important in quality determination. It is emphasized that this method cannot displace any of the methods in use already (including registrar documentation of individual cases and consultant review), but is additional, since the aggregated data is intended to be used for management purposes. The intention is primarily informative and educational, not punitive [11]. The method can be adapted to any condition and over varying periods of time. Various screening methods are used to select appropriate conditions (such as those contributing to high utilization, mortality, cost, length of stay); sampling may be required to reduce the number of applicable records in large institutions. The results in turn could provide validation for end-result indicators developed to assist in the management of good quality care.

Aspects of each of these methods were employed in this study, with emphasis on the latter.

PROBLEM :

To assess the quality of care provided by the Department of Paediatrics at King Edward VIII Hospital.

OBJECTIVES :

1. To identify manpower, accommodation, equipment and other material resources available to the Department.

2. To ascertain characteristics of the "process" of care (including utilization).

3. To identify and quantify "output" and "outcome" characteristics.

4. To assess quality of care, utilizing process, output and outcome characteristics and selected resource levels.

5. To make recommendations, where considered appropriate, concerning areas of possible improvement.

DEFINITIONS

1. Paediatric Department - The Department of Paediatrics of the University of Natal which is responsible for the paediatric outpatient and inpatient care at King Edward VIII Hospital.

2. Process characteristics - aspects of patient care (eg. examination, investigation, treatment, admission, discharge) and bed occupancy rates, length of stay, profile of diseases treated.

3. Measures of Output - eg. total and selected case - specific discharge rates.

4. Measures of Outcome - eg. total and selected case - specific death rates.

6. Resources - manpower (medical, nursing, auxiliary, clerical, students, domestic), equipment and other material resources.

METHOD AND RESULTS

1) The draft protocol was discussed in full with the Medical Superintendent responsible for the Department, and the Head and Senior Consultants of the Department. Written authority to conduct the study and for access to patient and other records was obtained. A final protocol (Appendix 1) was then drawn up: certain modifications were necessary and are discussed in their relevant sections.

2) A committee consisting of the researcher, senior consultants of the Paediatric Department and the medical superintendent responsible for the Paediatric Department was established. The committee was responsible for selecting conditions which were to be studied in depth in the unit. It also established the criteria for assessing the quality of care given in respect of each selected condition.

OBJECTIVE 1 :

a) MANPOWER : Full details of the Departments' staff, for all categories were gathered from the relevant personnel and departments. Posts filled and vacant were analyzed for trends. Official time allocation to perform duties and undertake responsibilities was determined as far as possible, from available rosters and other returns.

b) ACCOMMODATION, EQUIPMENT AND OTHER MATERIAL RESOURCES : Details of the accommodation, equipment and other material resources available to the Department were gathered from identified personnel and departments. Major items of equipment in stock in the Department were tabulated (beds, bassinets, cots, incubators, etc.). The administration, workshop and ward records were used to establish trends in usage and repair of this equipment.

RESULTS
RESOURCES

Staffing of the Paediatric Department (Objective 1 (a))

1. GENERAL ASSISTANTS: 25 General Assistants are employed for cleaning and other general purposes in the paediatric department. They are responsible for the 4 General Wards, the Neonatal Unit and the Outpatient Department. Detailed analysis of their duties was not undertaken.

2. CLERICAL STAFF: 12 Clerical personnel are attached to the Paediatric Unit. The tasks involve all aspects of the Paediatric Outpatient and Inpatient clerical duties of the hospital. Ward clerical work is in part conducted by a Nurse Aide with special clerical duties, but this post is a separate nursing post (see below). Detailed analysis of their duties was not undertaken.

3. NURSING: Staff statistics were gathered for the General Wards, the Neonatal Unit and the Paediatric Outpatient Department. There is a Matron (a relief is available in her absence) responsible for the paediatric patients at King Edward VIII Hospital (including the surgical wards and outpatients, but excluding the Neonatal Unit). During the night a senior sister (a relief is available) is in charge. There are 2 matrons for the whole Obstetrical department, which includes responsibility for the Nursery / Neonatal Unit (1 with a straight day shift, whilst the other is on 'broken' shift): at night 1 senior sister performs these roles for the whole Obstetrical unit and nursery.

3.1. General Wards: There are a total of 78 nursing staff manning the Paediatric Unit during the day. This includes 16 Registered Nurses, 33 Staff Nurses, 8 Nursing Assistants and 21 Student Nurses. The number per ward range from 18 to 21 (Table 1).

TABLE 1 DAY STAFF ESTABLISHMENT

GENERAL PAEDIATRIC WARDS

WARDS	REGISTER NURSE	STAFF NURSE	STUDENT NURSE	NURSE ASSISTANT	TOTAL
N1A	4	8	6	2	20
N1B	4	10	5	2	21
N2A	4	8	5	2	19
N2B	4	7	5	2	18
TOTAL	16	33	21	8	78

There are a total of 32 nursing staff (6 relief staff) manning the paediatric unit during the night. This includes 4 Registered Nurses (3 relief staff), 20 Staff Nurses and 8 Nursing Assistants (3 relief staff). The number per ward range from 8 to 11 (Table 2).

[The relief Registered Nurse at night is responsible for both the wards N2A and N2B. There is also only one relief Nursing Assistant for both N1B and N2B.]

TABLE 2 NIGHT STAFF ESTABLISHMENT

GENERAL PAEDIATRIC WARDS

WARDS	REGISTERED NURSE (RELIEF)	STAFF NURSE	NURSE ASSISTANT (RELIEF)	TOTAL
N1A	1 (1)	5	3 (1)	9
N1B	1 (1)	5	1 (1*)	7
N2A	1 (1*)	5	3 (1)	9
N2B	1 (1*)	5	1 (1*)	7
TOTAL	4 (4)	20	8 (4)	32

* Shared Relief staff.

3.2. Neonatal Unit: There are a total of 45 nursing staff manning the Neonatal Unit during the day. This includes 23 Registered Nurses, 19 Staff Nurses and Student Midwives and 3 Nursing Assistants (Table 3).

TABLE 3 STAFF ESTABLISHMENT

NEONATAL UNIT

WARDS	REGISTERED NURSE (RELIEF)	STUD. MIDWIFE and STAFF NURSE (RELIEF)	NURSE ASSISTANT (RELIEF)	TOTAL
DAY	23	19	3	45
NIGHT	3	22	0	25

3.3. Paediatric Outpatient Department: There are a total of 28 nursing staff manning the Paediatric Outpatient Department during the day. This includes 9 Registered Nurses, 10 Staff Nurses and 9 Nursing Assistants.

At night 5 staff are on duty in the department (3 relief staff). There is 1 Registered Nurse (and 1 relief nurse, who is also responsible for a surgical ward) (Table 4). 3 staff nurses (1 relief) and 1 Nursing Assistant (1 relief) make up the rest of the staff complement.

TABLE 4 STAFF ESTABLISHMENT

PAEDIATRIC OUTPATIENT DEPARTMENT

WARDS	REGISTERED NURSE (RELIEF)	STAFF NURSE (RELIEF)	NURSE ASSISTANT (RELIEF)	TOTAL
DAY	9	10	9	28
NIGHT	1 (1*)	3 (1)	1 (1)	5

* Shared Relief Staff

4. MEDICAL STAFF:

4.1. There have been no changes in the medical officer / registrar / consultant staff allocations to the department since 1980. As posts become available these have been advertized and filled in reasonable time (one post is vacant at present and is likely to be filled in September, 1987).

Table 5 indicates the number and distribution of staff prior to July 1987. The important aspects here are those relating to the staff on the General Wards and the Neonatal Unit. In the General Wards one registrar was assigned to each ward (52 to 60 beds). He was accountable to 2 consultants and had 2 house officers to supervise and assist in training.

TABLE 5 MEDICAL STAFF

PRIOR TO RESHUFFLE 1987

JOINT STAFF - CONSULTANTS: 13 plus 8 SESSIONS PART TIME

	REGISTRARS	MEDICAL OFFICERS	TOTAL
GENERAL WARDS	4	8	12
NEONATAL UNIT	2	3	5
POPD GENERAL	(1)	4	4 (1)*
POPD RESUSCITATION	1	1	2
RESPIRATORY UNIT	1 (1)	2	3 (1)*
RELIEF	1	3	4
K.E.H. TOTAL	9	21	31 **
CLAIRWOOD HOSP.	2	4	6
R.K. KHAN HOSP.	2		2
TOTAL	13	25	39* plus 8 SESSIONS PART TIME

* Post shared between Paediatric Respiratory Unit (RUM) and Paediatric Outpatient Department (POPD).

** One vacant post.

Table 6 indicates the number and distribution of staff as a result of a reshuffle of staff in July 1987. The purpose of this change was to try to improve what was perceived as an unacceptable staff distribution (as outlined above). In effect 1 consultant is now responsible for 1 registrar and 1 house officer on the General Wards. This has been achieved by incorporating an additional consultant on Ward N1B, by reducing the registrar quota in the Neonatal Unit, the Respiratory Unit and at Clairwood Hospital. The effects of this will not be known until later: the overall staff numbers have not changed.

TABLE 6 MEDICAL STAFF

AFTER RESHUFFLE 1987

JOINT STAFF - CONSULTANTS: 13 plus 8 SESSIONS PART TIME

	REGISTRARS	MEDICAL OFFICERS	TOTAL
GENERAL WARDS	7	7	12
NEONATAL UNIT	1	4	5
POPD GENERAL	(1)	4	4 (1)*
POPD RESUSCITATION		1	2
RESPIRATORY UNIT	(1)	3	3 (1)*
RELIEF	1	2	4
K.E.H. TOTAL	9	21	31 **
CLAIRWOOD HOSP.	3	3	6
R.K. KHAN HOSP.	2		2
TOTAL	14	24	39* plus 8 SESSIONS PART TIME

* Post shared between RUM and POPD.
** One vacant post.

Comparison with other institutions was not the intention of this study. The differing circumstances and means of collating data at each institution makes this a difficult task: the internal nature of this study makes these comparisons unnecessary.

4.2. The teaching commitment of the senior staff is tabulated in Table 7. This indicates that an average actual student contact of 184 hours per annum per senior member occurs. It is not possible to comment on the time required for preparation and organization. Nor is one able to comment on the additional involvement of the junior staff in aspects of this work; in many cases this may be substantial. The work undertaken is for several disciplines besides Paediatric courses, including Nursing and Community Health courses. In addition to this, mention must be made of the research and other official commitments of the senior staff; there are obvious difficulties in quantifying the time devoted to these issues.

TABLE 7 TEACHING COMMITMENT 1986

SENIOR JOINT STAFF - CONSULTANTS

ACTIVITY	HOURS / YEAR
LECTURES	27
TUTORIALS	1417
PRACTICALS	125
WARD ROUNDS	821
TOTAL	2390

Source: SAPSE returns 1986.

Accommodation, Equipment and other Material Resources (Objective 1 (b))

1. Accommodation

1.1. GENERAL WARDS

The official bed numbers available in the department are as shown in Table 8. This total of 224 is the same for 1986 (the period of the Inpatient study) and for 1987. Although the figure must be used in calculations of statistics (such as bed occupancy), it must be noted that there are some difficulties in equating the individual units which make up these beds (for example, bassinets can only be used for the under 6 month old infant).

TABLE 8 BED STATUS GENERAL PAEDIATRIC WARDS

	N 1 A	N 1 B	N 2 A	N 2 B	TOTAL
NUMBER	60	52	60	52	224

The Equipment Section of the hospital administration provided the last stock-take record for the wards, listing all furniture and instruments actually in their possession (April 1987) - Table 9. Only the major items are tabulated. Of the 75 bassinet stands available, only 44 are in use. The demand for these bassinets is limited compared to the demand for cots (which includes the juvenile beds) - this is confirmed by reviewing the utilization characteristics of the wards (Objective 2). There has been an attempt to rectify this internally during July 1987. In Ward N1B (which only treats gastroenteritis cases) the number of cots available for use has marginally increased: this has been made possible by a redistribution within the wards (Table 10). One incubator has been condemned in April 1987, but was available for use on the wards until December 1986. An extra cot has been issued in its place.

The number of mattresses on the wards are shown for 1986 - it is noted that there are sufficient for use on the beds provided - some exchange must have be taking place between the wards.

TABLE 9 BED STATUS - TYPES - PRIOR TO RESHUFFLE IN JULY 1987

GENERAL PAEDIATRIC WARDS

WARDS	COTS / JUVENILE BEDS	BASSINETS	INCUBATORS	TOTAL
N 1 A	48 (45)	13 (11)	2	63
N 1 B	36 (34)	35 (34)	3	74
N 2 A	43 (49)	14 (25)	5	62
N 2 B	40 (41)	13 (11)	3	56
TOTAL	167 (169)	75*(81)	13	255**

* Only 44 in USE. ** TOTAL : 224 in USE

TABLE 10 BED STATUS - TYPES - AFTER RESHUFFLE IN JULY 1987

GENERAL PAEDIATRIC WARDS * Only IN USE tabulated

WARDS	COTS / JUVENILE BEDS	BASSINETS	INCUBATORS	TOTAL
N 1 A	48	10	2	60
N 1 B	40	10	2	52
N 2 A	40	15	5	60
N 2 B	40	19	3	52
TOTAL	168	44	12	224

1.2. CLAIRWOOD HOSPITAL

Objective 2 (e) requires that the bed occupancy rate and length of stay for King Edward Hospital paediatric patients be studied. These figures are not, however, readily available. The length of stay for these patients is stored by the central computer in a form which also includes the period which many of the patients spend at Clairwood Hospital. In order to answer the objective, therefore, the number of patient days for patients originating from the Paediatric Department at Clairwood Hospital and the number of bed days used by the department at Clairwood Hospital is required. Appendix 2 contains the details of information furnished by Clairwood Hospital.

No fixed number of beds is available for use by the department: Clairwood Hospital make beds available on a daily basis, which are apparently always used (letter from Medical Superintendent dated 18/08/87). For the general wards, the total patient days for 1986 for King Edward VIII patients at Clairwood was 85426, with a mean of 234 beds used per day (range 212 to 257) and a total number of patients of 3100. For the fever wards (wards reserved for children suffering from diseases of an infectious nature), the total number of patient days for 1986 for King Edward VIII patients at Clairwood was 24886, with a mean of 68 beds used per day (range 51 to 85) and a total number of patients of 3490.

1.3. NEONATAL UNIT

The official bed numbers for the neonatal unit are at present 120. At the time of the stock-take, there were 11 incubators and 108 bassinets available (Table 11). A twelfth incubator which was condemned has been replaced by a bassinet to restore the number of beds to 120. To try and overcome the demand for the controlled environment an incubator provides, the general temperature of the ward is raised by heaters: an airconditioner is provided for the section containing the specialized equipment.

TABLE 11 BED STATUS NEONATAL UNIT

	BASSINETS	INCUBATORS	TOTAL
STOCKTAKE APRIL 1986	108 (109)	11	119
JULY 1987	109 (109)	11	120

1.4. REPAIRS

Table 12 indicates the number of items which are were sent for repair during the period April 1986 to April 1987.

26.3 % of the cots / juvenile beds (44 of 167) were repaired during this period. Most of the repairs on these cots were undertaken by the maintenance section at the hospital and therefore the majority of the cots were returned for use within 2 weeks (88.6 %).

18.6 % of the bassinets (34 of 183) were likewise sent for repair: 88.3 % (30) were within 2 weeks.

However, the position is different for the more complex incubators. 83.3 % required repairs during the year period (20 of 24, excluding the one which was condemned in the neonatal unit). Only 65.0 % of these items could be returned for use within 2 weeks; 20.0 % were not in use for over 3 weeks.

TABLE 12 REPAIRS - BEDS/COTS / BASSINETS / INCUBATORS

PAEDIATRIC DEPARTMENT- APRIL 1986 TO APRIL 1987

PERIOD EXPIRED BEFORE RETURN TO USE

ITEM	REPAIR TIME IN DAYS				TOTAL (Perc)
	0 - 7	7 - 14	14 - 21	> 21	
BEDS / COTS	29 (65.9)	10 (22.7)	4 (9.1)	1 (2.3)	44 (100)
BASSINETS	27 (79.5)	3 (8.8)	3 (8.8)	1 (2.9)	34 (100)
INCUBATORS	10 (50.0)	3 (15.0)	3 (15.0)	4 (20.0)	20 (100)

It is realized that these figures are only averages, since many items do not need repair for many years, if at all in the case of cots and bassinets. However, considering these averages as representative of the items durability and repair requirement as a whole, the average time between repairs for each items can be calculated. In the case of cots / juvenile beds, an item will need repair every 3.8 years on average. Each bassinet will need repair on average every 5.4 years.

Incubators, however, on average need repair every 1.2 years. Whilst it is understood that much work can and should be conducted on the premises for reasons of cost effectiveness, in the case of incubators consideration should perhaps be given to some form of maintenance contract. The demand for incubators is discussed in other sections of this study and means to improve their utilization need to be found (if an item is to take a long period to repair, an immediate replacement could be effected under the agreement).

2. Other Equipment.

Table 13 lists some of the more major items in use in the paediatric department. Reference to these figures will be made in later discussions in this text, when the utilization and other aspects of the demand and the process of care are elucidated.

TABLE 13 MAJOR EQUIPMENT ITEMS : PAEDIATRIC DEPARTMENT

WARD	NEONATAL RESUSCITATOR	VENTILATOR VENTIDOME	GLUCOMETER	HAEMOGLOBIN - METER	FLOWMETERS	IVAC PUMP & EQUIV.
N 1 A	3		1	1	9	2
N 1 B	3			1	6	1
N 2 A	3		1	1	5	2
N 2 B	1		1	1	8	2
SUB TOTAL	10		3	4	28	7
NEONATAL	2	9	1	3	53	21
TOTAL	12	9	4	7	71	28

PROCESS OF CARE

Utilization of services : Outpatients (Objective 2 (a))

Purpose :

To determine a profile of diseases treated and the number of attendances, admissions, transfers and deaths occurring in the paediatric outpatient department during the study period (13 May - 19 May, inclusive).

Reduction of Bias :

A standard checklist was used for the study period. All patients attending during this period were included in the survey.

Method :

The General Outpatients Department (POPD) and the Procedure and Resuscitation Unit (PRU) were included in the study. The specialist clinics were not included. (The PRU is intended to be a high care area, providing a resuscitation facility for patients who are dehydrated prior to admission or discharge (if fully recovered). This unit was considered a part of the POPD at the time of the study, although mainly manned by ward staff. Subsequently, the patients seen here are considered to be 'inpatients' for statistical purposes only.)

A checklist was drafted by the researcher and was finalized in conjunction with the committee (Appendix 3). Information was gathered on each patient attending the Department during the study period. This consisted of the outpatient number, age, sex and race of the patient and the diagnostic details, episode of care for each condition (first, repeat, review during the current visit) and the outcome of the consultation. The conditions were grouped according to commonly occurring conditions.

The clerical, nursing and medical staff were fully briefed as to the purpose and method of the study. The checklist was completed by the attending doctor or nurse, following the normal consultation. New checklists were issued daily and the completed lists collected for collation and analysis. The data was collated manually.

A pilot study was undertaken over a two day period, during which time no major changes to the format were identified as being necessary.

Limitations of the Study :

Unfortunately, no data is routinely collected regarding the conditions which present at the outpatient department and to establish this a study of this nature is required. However, it cannot take into account seasonal trends, nor establish workload patterns. Workload was estimated by analyzing historical attendance data.

Because cooperation of the busy staff was required, it was considered necessary, by the committee, to limit the length of the study to one week.

Workload and trends were studied by analyzing the daily attendance figures which are routinely gathered in the department.

An analysis of the completeness of the data is undertaken in Appendix 4. The attendances according to the survey amounted to 78 % of those recorded routinely in the Outpatient Department. The in-depth study of the selected conditions enabled an analysis of the accuracy of the data collected and reference should be made to Appendix 5 where this is discussed.

Results :

1. ATTENDANCE BY AGE

The total number of attenders during the study period was 1923: age characteristics [12] were recorded for 1875 (97.5 %) of these (Table 14). 41.8 % (785) of attendances were in respect of patients under 1 year of age. An additional 676 patients (36.1 %) were between the ages of 1 and 4 years. Only 22.1 % of attenders (414) were over the age of 4 years.

TABLE 14 AGE OF ATTENDERS POPD 13 - 19 MAY 1987
Number and (Percent)

	1 - 27 Days	28 - 1 Year	1 - 4 Years	> 4 Years	Total
Number	106	679	676	414	1875
Percent	(5.6)	(36.2)	(36.1)	(22.1)	(100)

2. ATTENDANCE BY SEX CHARACTERISTIC

Gender was recorded in 95 % of patients (1825), as depicted in Table 15. 51.5 % of the attenders were male and 48.5 % were female.

TABLE 15 SEX CHARACTERISTICS OF ATTENDERS POPD 13 - 19 MAY 1987
Number and (Percent)

	MALE	FEMALE	Total
Number	941	885	1826
Percent	(51.5)	(48.5)	(100)

3. PROFILE OF CONDITIONS TREATED POPD 13 - 19 MAY 1987

Tables 16 and 18 list the profile of conditions treated during the study period. Of the 1923 consultations recorded, data was available for 97.7 % (1879). 1254 (65.2 %) of consultations were of first or repeat attenders and 625 (33.3 %) of consultations were in respect of reviewing patients kept in the department under observation.

3.1. First and Repeat Attendances - Profile of Presenting Conditions

3.1.1. Presenting Conditions

The vast majority of attendances were in respect of Respiratory System (701) and Gastrointestinal System (425) complaints, which amounted to 38.1 % and 23.1 % of attendances respectively. Skin (130) and Central Nervous System (106) conditions accounted for 7.1 % and 5.8 % respectively. Malnutrition (100) and Ear, Nose and Throat (100) categories accounted for 5.4 % each. The category 'Infection' was also recorded in 5.4 % of cases (100), the main contribution being secondary infection related to measles. Only 95 conditions were not classified (5.2 %).

The specific disorders accounting for the majority of attendances were gastroenteritis (334, 18.2%), pneumonia (256, 13.9 %), upper respiratory tract infection (254, 13.8 %), skin (130, 7.1 %), Ear, Nose and Throat and Malnutrition (100, 5.4 % each).

3.1.2. Ratio of First to Repeat Attenders

Of the 1838 presenting conditions, 75.2 % (1382) were in respect of first attendances for that condition. 456 (24.8 %) were for repeat attendances. Considering the six commonest presenting conditions the rate of first attendances is generally higher than this average: gastroenteritis (82.6 %), pneumonia (75.4 %), upper respiratory infections (79.5 %, skin (82.3 %), malnutrition (74.0 %) and ear, nose and throat (86.0%).

TABLE 16 PROFILE CONDITIONS TREATED : POPD ACCORDING TO EPISODE OF CARE

DISEASE /CONDITION	FIRST	REPEAT	TOTAL	Perc
CENTRAL NERVOUS SYSTEM	63 (59.4)	43 (40.6)	106 (100)	5.8
Convulsions	19 (47.5)	21 (52.5)	40 (100)	
Developmental Delay	16 (57.1)	12 (42.9)	28 (100)	
Meningitis	10 (90.1)	1 (8.9)	11 (100)	
Other	18 (66.7)	9 (33.3)	27 (100)	
CARDIOVASCULAR SYSTEM	9 (69.2)	4 (30.8)	13 (100)	0.7
EAR, NOSE and THROAT	86 (86.0)	14 (14.0)	100 (100)	5.4
Otitis Media	43 (78.2)	12 (21.8)	55 (100)	
Other	43 (95.6)	2 (4.4)	45 (100)	
GASTROINTESTINAL SYSTEM	349 (82.1)	76 (17.9)	425 (100)	23.1
Gastroenteritis	276 (82.6)	58 (17.4)	334 (100)	
Parasitic Disorders	47 (83.9)	9 (16.1)	56 (100)	
Other	26 (74.3)	9 (25.7)	35 (100)	
GENITOURINARY TRACT	20 (74.1)	7 (25.9)	27 (100)	1.5
INFECTIONS	85 (85.0)	15 (15.0)	100 (100)	5.4
Measles	68 (85.0)	12 (15.0)	80 (100)	
Other	17 (85.0)	3 (15.0)	20 (100)	
MALNUTRITION	74 (74.0)	26 (26.0)	100 (100)	5.4
DISORDERS IN NEONATES	10 (45.5)	12 (54.5)	22 (100)	1.2
RESPIRATORY SYSTEM	491 (70.0)	210 (30.0)	701 (100)	38.1
Upper respiratory	202 (79.5)	52 (20.5)	254 (100)	
Pneumonia	193 (75.4)	63 (24.6)	256 (100)	
Asthma	29 (29.9)	68 (70.1)	97 (100)	
Bronchiolitis	54 (72.0)	21 (28.0)	75 (100)	
Other	13 (68.4)	6 (31.6)	19 (100)	
SKIN	107 (82.3)	23 (17.7)	130 (100)	7.1
TUBERCULOSIS	11 (57.9)	8 (42.1)	19 (100)	1.0
OTHER	77 (81.1)	18 (18.9)	95 (100)	5.2
TOTAL	1382 (75.2)	456 (24.8)	1838 (100)	100
Percent	52.9	17.5 29.6	100	

3.1.3. Conditions per Patient Attending

The 1254 patients who attended during the study period presented with 838 conditions, which represents a rate of 1.5 illnesses per patient. The in-depth analysis of three of the most common conditions (gastroenteritis, pneumonia and malnutrition) shows the interrelationships of these conditions (Table 17). 72.7 % of malnutrition cases, 29.8 % of pneumonia and 31.7 % of gastroenteritis cases presented with one or other or both of the other two conditions. (Details of the sample are given under Objective 2 (c).)

TABLE 17 MULTIPLE ILLNESS PRESENTATIONS

	ALONE	WITH MALNUTRITION OR PNEUMONIA OR GASTROENT	WITH ALL THREE CONDITIONS	TOTAL
MALNUTRITION	9 (27.3)	20 (60.6)	4 (12.1)	33 (100)
PNEUMONIA	66 (70.2)	23 (24.5)	5 (5.3)	94 (100)
GASTROENTERITIS	97 (68.3)	42 (29.6)	3 (2.1)	142 (100)

3.2. Profile of Conditions - including Review Consultations

3.2.1. Presenting Conditions

When considering all the consultations undertaken, including those cases which were reviewed again during the current visit, the main changes in the disease profile were in respect of Respiratory System (total 1030) and Gastrointestinal System (total 683) complaints, which were 39.4 % and 261 % of attendances respectively. The percentage of consultations for Infectious conditions (160, 6.1 %) also increased.

The specific disorders accounting for the majority of consultations (as reflected in Table 18) are as follows: Gastroenteritis (549, 21.0%), pneumonia (450, 17.2 %), upper respiratory tract infection (289, 11.1 %), asthma (147, 5.6 %), malnutrition (134, 5.1 %), and bronchiolitis (115, 4.4 %). [There were inaccuracies in the marking of the survey forms - this was quantified for those conditions which were studied in depth, and possible reasons discussed in Appendix 5. However, no change in the order of these conditions occurs when these factors are allowed for.]

TABLE 18 PROFILE OF DISEASES TREATED : POPD ACCORDING TO TYPE OF CONSULTATION

DISEASE /CONDITION	FIRST/REPEAT	REVIEW	TOTAL	Perc
CENTRAL NERVOUS SYSTEM	106 (80.3)	26 (19.7)	132 (100)	5.1
Convulsions	40 (74.1)	14 (25.9)	54 (100)	
Developmental Delay	28 (90.3)	3 (9.7)	31 (100)	
Meningitis	11 (78.6)	3 (21.4)	14 (100)	
Other	27 (81.8)	6 (18.2)	33 (100)	
CARDIOVASCULAR SYSTEM	13 (86.7)	2 (13.3)	15 (100)	0.6
EAR, NOSE and THROAT	100 (89.3)	12 (10.7)	112 (100)	4.3
Otitis Media	55 (88.7)	7 (11.3)	62 (100)	
Other	45 (90.0)	5 (10.0)	50 (100)	
GASTROINTESTINAL SYSTEM	425 (62.2)	258 (37.8)	683 (100)	26.1
Gastroenteritis	334 (60.8)	215 (39.2)	549 (100)	
Parasitic Disorders	56 (65.9)	29 (34.1)	85 (100)	
Other	35 (71.4)	14 (28.6)	49 (100)	
GENITOURINARY TRACT	27 (67.5)	13 (32.5)	40 (100)	1.5
INFECTIONS	100 (62.5)	60 (37.5)	160 (100)	6.1
Measles	80 (63.5)	46 (36.5)	126 (100)	
Other	20 (58.8)	14 (41.2)	34 (100)	
MALNUTRITION	100 (74.6)	34 (25.4)	134 (100)	5.1
DISORDERS IN NEONATES	22 (75.9)	7 (24.1)	29 (100)	1.1
RESPIRATORY SYSTEM	701 (68.1)	329 (31.9)	1030 (100)	39.4
Upper respiratory	254 (87.9)	35 (12.1)	289 (100)	
Pneumonia	256 (56.9)	194 (43.1)	450 (100)	
Asthma	97 (66.0)	50 (34.0)	147 (100)	
Bronchiolitis	75 (65.2)	40 (34.8)	115 (100)	
Other	19 (65.5)	10 (34.5)	29 (100)	
SKIN	130 (90.3)	14 (9.7)	144 (100)	5.5
TUBERCULOSIS	19 (79.2)	5 (20.8)	24 (100)	0.9
OTHER	95 (87.2)	14 (12.8)	109 (100)	4.2
TOTAL	1838 (70.4)	774 (29.6)	2612 (100)	100
Percent	52.9	29.6	100	

4. OUTCOME OF CONSULTATION

Table 19 refers to the outcome of patients seen during the study period. The apparent excess in 'outcomes' is because several cases had more than one outcome.

The definition of 'Review' applied here was slightly different to that used with respect to the consultation (Tables 16-18) and accounts for the high percentage of reviews asked for (40.6 %, 783). This figure represents i) all cases where investigations (such as X-rays) were asked for, with the intention of these being interpreted during the same visit, and ii) includes those cases which were to be observed for subsequent re-examination.

527 cases (27.3 %) were discharged, where no further contact with the health care system was considered necessary.

13.0 % of cases were asked to return at a subsequent date for follow up (250).

180 (9.3 %) cases were referred to other specialties , clinics or hospitals for further consultation or follow up.

6.6 % of cases were admitted to the wards (127). The Hospital admission figures for this period are given as 155 (ie the sample captured 81.9 % of admissions.

2 patients died during the study period in the outpatient department.

TABLE 19 OUTCOME OF CONSULTATIONS

	REVIEW	DISCHARGE	RETURN	REFERRED	TRANSFER	ADMITTED	DIED	UNKNOWN	TOTAL
NUMBER	783	527	250	132	48	127	2	61	1930
PERCENT	40.6	27.3	13.0	6.8	2.5	6.6	0.1	3.2	100

Discussion: Profile of Diseases

Gastroenteritis is the disease of highest frequency treated in the outpatient department, comprising 18.2 % of illnesses. A second severe disease, pneumonia contributes another 13.9 % of patients. These conditions often occur together and are often compounded by malnutrition. Pneumonia and gastroenteritis following measles infection is common. When considering the **AGE OF ATTENDERS** profile (77.9 % of attenders were under the age of 4 years) the potential seriousness of these conditions must be noted. The high **REVIEW RATES** for these conditions also indicate the severity of the conditions. The majority presented for the **FIRST TIME** (gastroenteritis 82.6 %, pneumonia 75.4 %, overall 75.2 %), confirming their acute nature. The gastroenteritis cases treated in the PRU are all moderately to severely dehydrated - adequate use of oral rehydration in the home or local clinic could possibly prevent their presentation at the hospital.

Another area of concern is the contribution of a disease which is imminently preventable by single immunization (measles).

Malnutrition adds to the severity of these and other diseases.

The 1.5 **ILLNESSES PER PATIENT** quoted in the text, is mainly due to the combination of illnesses as described above. Although it has recently been decided to consider the PRU patients as inpatients for statistical purposes, they are in fact still outpatients and may remain there for more than 24 hours (see Objective 2 c). The pneumonia cases under review may also remain in the outpatient department for 24 hours overnight, a floor bed and meal being provided for the accompanying adult.

The 'review' cases in terms of the **OUTCOME** include those who had to undergo x-ray and other examinations and constitute 40.6 % of the outcome findings. While there is no indication as to the number of patients who were requested to be reviewed who were actually seen again, this finding indicates the nature of the service provided (severity of cases and number of investigations being performed).

However, over a quarter (527; 27.2 %) of the patients were not asked to return to the department on a subsequent day. When this is considered along with the low percentage of patients (13.0 %; 250) who were asked to return (and noting that only 456 patients (24.8 %) were classified as being seen for at least the second time for that condition ie REPEAT cases), it is apparent that the medical staff are not reluctant to release their patient load or to hold on to their patients unnecessarily.

Another 180 patients (9.3 %) were referred to another department or hospital / clinic, which is in keeping with the above observation.

Utilization of the Services - Inpatients
(Objective 2(b))

Purpose :

To determine a profile of diseases treated and the number of discharges and deaths in the paediatric department during the period January to December 1986.

Method :

The hospital records department undertook a computer search of its data files for the period under investigation.

Results :

1. PROFILE OF DISEASES ADMITTED DURING 1986 - PAEDIATRIC WARDS

1.1. Admissions Paediatric Wards (N1, N2) 1986: According to Month of Admission - Totals and Deaths

The mean monthly admissions for 1986 were 680 patients (Table 20), with a range of 901 in March (11.0 % of total admissions) to 529 in November (6.5 %). Total admissions were 8164, of which 946 (11.6 %) died. The death rates were highest in January (15.9 %; 114 of 719 patients admitted) and February (14.0 %; 107 of 763 patients admitted).

There is a statistically significant association between the number of deaths and the total admissions (X^2=44; v=11; p <.01). This is particularly marked for January, where a higher than expected death rate occurred. December, November and October months had significantly lower numbers of deaths.

When considering the data for a single ward (N1B - gastroenteritis ward- see Objective 3) this association was again seen: the contrast was more marked, with a much higher number of expected deaths for the month of January and much lower for the month of December. However, the tendency was not significant for 1987 for this ward as depicted in the Table 91, *when the bed occupancy was lower.*

1.2. Admissions Paediatric Wards (N1, N2) 1986: Length of Stay According to Month of Admission

It is important to note that for patients transferred to Clairwood Hospital at any time during their stay in hospital, the patient days are INCLUDED in the following figures.

Of the 8164 admissions, 2455 (30.1 %) stayed in the wards for longer than 14 days (Figure 1: Table 21). This represents a monthly average of 205 patients in the wards for more than 2 weeks [ranging from 234 in January and March to 166 in November].

There is no statistically significant association between the number of longer staying patients and total admissions (X^2=17.5; v=11; p >0.5).

Figure 1

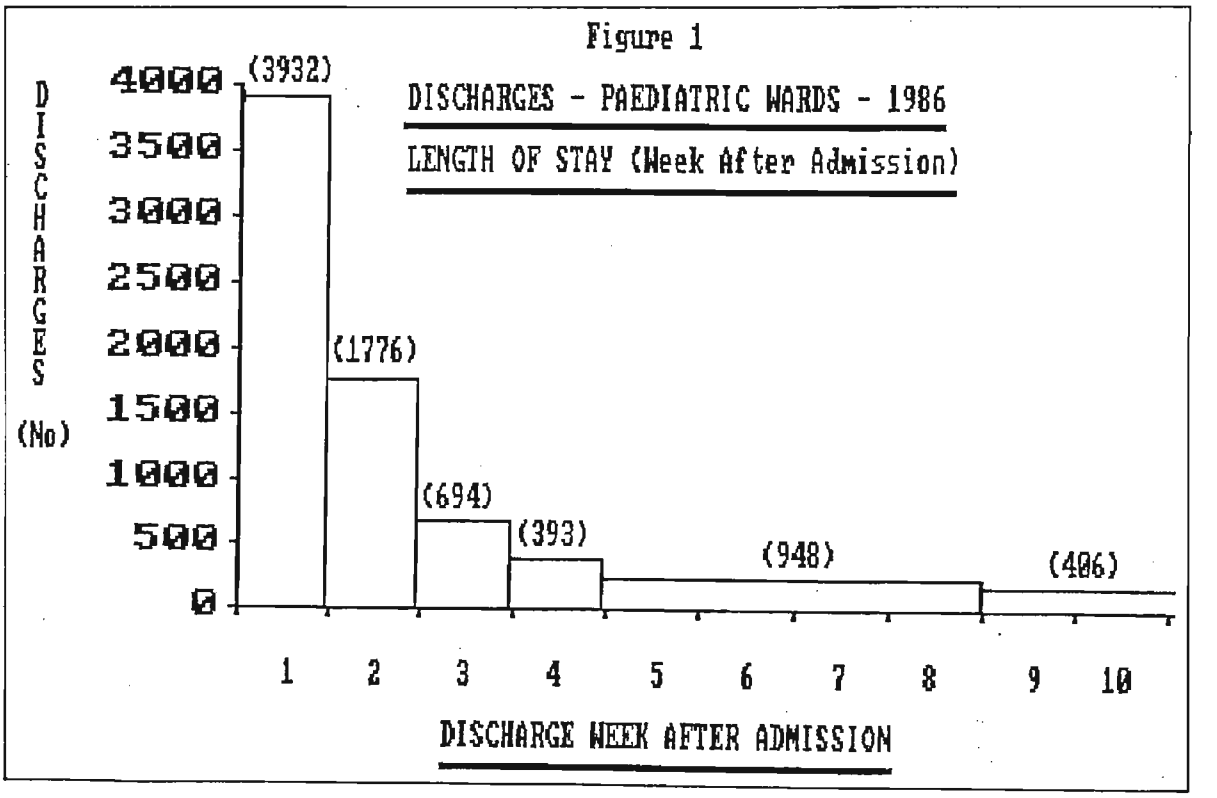


TABLE 20 ADMISSIONS TO PAEDIATRIC WARDS (N1, N2) - 1986
BY MONTH OF ADMISSION (TOTAL AND DEATHS)
(Number and Percent)

MONTH	ALIVE	DEAD	TOTAL	Percent
JANUARY	605 (84.1)	114 (15.9)	719 (100)	8.8
FEBRUARY	656 (86.0)	107 (14.0)	763 (100)	9.3
MARCH	798 (88.6)	103 (11.4)	901 (100)	11.0
APRIL	635 (86.5)	99 (13.5)	734 (100)	9.0
MAY	629 (87.4)	91 (12.6)	720 (100)	8.8
JUNE	535 (87.6)	76 (12.4)	611 (100)	7.5
JULY	598 (89.0)	74 (11.0)	672 (100)	8.2
AUGUST	549 (88.5)	71 (11.5)	620 (100)	7.6
SEPTEMBER	560 (89.5)	66 (10.5)	626 (100)	7.7
OCTOBER	600 (91.3)	57 (8.7)	657 (100)	8.0
NOVEMBER	488 (92.2)	41 (7.8)	529 (100)	6.5
DECEMBER	565 (92.3)	47 (7.7)	612 (100)	7.5
TOTAL	7218 (88.4)	946 (11.6)	8164 (100)	100.0

TABLE 21 ADMISSIONS TO PAEDIATRIC WARDS (N1,N2) - 1986
LENGTH OF STAY BY MONTH OF ADMISSION
(Number and Percent)

MONTH	LENGTH OF STAY		TOTAL	Percent
	≤2 WEEKS	>2 WEEKS		
JANUARY	485 (67.5)	234 (32.5)	719 (100)	8.8
FEBRUARY	554 (72.6)	209 (27.4)	763 (100)	9.3
MARCH	667 (74.0)	234 (26.0)	901 (100)	11.0
APRIL	512 (69.8)	222 (30.2)	734 (100)	9.0
MAY	493 (68.5)	227 (31.5)	720 (100)	8.8
JUNE	424 (69.4)	187 (30.6)	611 (100)	7.5
JULY	464 (69.0)	208 (31.0)	672 (100)	8.2
AUGUST	427 (68.9)	193 (31.1)	620 (100)	7.6
SEPTEMBER	428 (68.2)	199 (31.8)	626 (100)	7.7
OCTOBER	476 (72.5)	181 (27.5)	657 (100)	8.0
NOVEMBER	363 (68.6)	166 (31.4)	529 (100)	6.5
DECEMBER	417 (68.1)	195 (31.9)	612 (100)	7.5
TOTAL	5710 (69.9)	2455 (30.1)	8164 (100)	100.0

1.3. Admissions Paediatric WArds (N1, N2) 1986: According to Age Group-Totals and Deaths

3350 (41.4 %) of patients admitted were between the ages of 1 month and 1 year. A further 31.8 % (2589) were patients aged between 1 and 4 years. Only 9.7 % (782) of admissions were patients under the age of 1 month. (Table 22)

The age group with the highest death rate (16.3 %; 58 of 355 patients) was the 8 to 31 day age group. The highest number of deaths (486 of the 946; 51.4 %) occurred in the 1 to 11 month age group. This accounted for 14.5 % of the 3350 patients in this group (486).

Significantly more deaths occur in the 1 to 11 month age groups of patients (X^2=101; v=4; $p < 0.001$) than expected.

TABLE 22 ADMISSIONS TO PAEDIATRIC WARDS (N1,N2) - 1986
ACCORDING TO AGE GROUP (TOTAL AND DEATHS)
(Number and Percent)

AGE	ALIVE	DEAD	TOTAL	Perc
0 - 1 DAY	20 (87.0)	3 (13.0)	23 (100)	0.3
2 - 7 DAYS	359 (88.9)	45 (11.1)	404 (100)	5.0
8 - 31 DAYS	297 (83.7)	58 (16.3)	355 (100)	4.4
1 - 11 MNTHS	2864 (85.5)	486 (14.5)	3350 (100)	41.1
1 - 4 YRS	2303 (89.0)	286 (11.0)	2589 (100)	31.8
5 - 12 YRS	1360 (95.2)	68 (4.8)	1428 (100)	17.5
OVER 12 YRS	-	-	-	-
TOTAL	7203 (88.4)	946 (11.6)	8149 (100)	100

1.4. Admissions Paediatric Wards (N1, N2) 1986: Length of Stay According to Age Group

(Table 23) 42.6 % of the patients (609) in the 5 to 12 year age group and 40.5 % of the 1 to 4 year age group (1048) remained in hospital for more than 14 days. 784 (19.0 %) of patients under 1 year of age (4132) had lengths of stay greater than 2 weeks.

It is clear that significantly more children over 1 year of age were admitted for periods of more than two weeks (X^2=535; v=4; p <0.001).

TABLE 23 ADMISSIONS TO PAEDIATRIC WARDS (N1,N2) - 1986
LENGTH OF STAY ACCORDING TO AGE GROUPS
(Number and Percent)

AGE	LENGTH OF STAY		TOTAL	Perc
	≤2 WEEKS	>2 WEEKS		
0 - 1 DAY	21 (91.3)	2 (8.7)	23 (100)	0.3
2 - 7 DAYS	376 (93.1)	28 (6.9)	404 (100)	5.0
8 - 31 DAYS	320 (90.1)	35 (9.9)	355 (100)	4.4
1 - 11 MNTHS	2631 (78.5)	719 (21.5)	3350 (100)	41.1
1 - 4 YRS	1541 (59.5)	1048 (40.5)	2589 (100)	31.8
5 - 12 YRS	819 (57.4)	609 (42.6)	1428 (100)	17.5
OVER 12 YRS	-	-	-	-
TOTAL	5708 (70.0)	2441 (30.0)	8149 (100)	100.0

2. NEONATAL UNIT

An analysis of the computer data for the Neonatal Unit revealed a significant source of error (Table 24). For 1986, 10274 patients were recorded as admissions to the unit. Comparison with data from the Paediatric Department (see Objective 3), however, showed this to be include an excess of some 4000 patients. On investigation it was revealed that on average 333 patients are seen in the Unit by the medical staff monthly (and are hence issued with hospital case sheets) but who are not formally admitted to the Unit. Whilst these cases are not admissions, they are consultations and hence are an additional workload for the Department. They are included in the results given below, but as it is not possible to separate them from the true admissions, no calculations of length of stay or occupancy for the ward as a whole can be done using these data. The "admissions" referred to below must therefore be read to include this select group of patients: generally these infants are in hospital, but are in the care of their mothers in the obstetrical unit.

2.1. Admissions Neonatal Unit 1986: According to Month of Admission-Totals and Deaths

The annual admissions for 1986 were 10274. The monthly admissions ranged from 956 patients in September (9,3 %) of the annual total) to 746 in June (7,4 %).

Total deaths recorded over this period were 488, which represents 4,8 % of admissions. As with the admission rates of the other wards, there was little variation in the monthly rates, deaths ranging from 5,3 % of admissions (47 of 891 patients) in August to 3,6 % (30 of 838 patients) in February.

There was no significant association between the number of deaths and the number of admissions (X^2=6,68; v=11; p > 0,5).

TABLE 24 ADMISSIONS TO NEONATAL UNIT - 1986
BY MONTH OF ADMISSION (TOTAL AND DEATHS)
(Number and Percent)

MONTH	ALIVE	DIED	TOTAL	Perc
JANUARY	782 (94.8)	43 (5.2)	825 (100)	8.0
FEBRUARY	808 (96.4)	30 (3.6)	838 (100)	8.2
MARCH	773 (95.0)	41 (5.0)	814 (100)	7.9
APRIL	783 (95.4)	38 (4.6)	821 (100)	8.0
MAY	787 (94.3)	48 (5.7)	835 (100)	8.1
JUNE	733 (95.9)	31 (4.1)	764 (100)	7.4
JULY	829 (95.6)	38 (4.4)	867 (100)	8.4
AUGUST	844 (94.7)	47 (5.3)	891 (100)	8.7
SEPTEMBER	912 (95.4)	44 (4.6)	956 (100)	9.3
OCTOBER	830 (95.3)	41 (4.7)	871 (100)	8.5
NOVEMBER	864 (95.0)	45 (5.0)	909 (100)	8.8
DECEMBER	841 (95.2)	42 (4.8)	883 (100)	8.6
TOTAL	9786 (95.3)	488 (4.7)	10274 (100)	100

2.2. Admissions Neonatal Unit 1986: Length of Stay According to Month of Admission

Of the 10274 admissions in 1986, 462 (4.5 %) stayed in the unit for more than 14 days. This ranged from 6.1 % (50 of 825 patients) in January to 3.1 % (26 of 835 patients) in May (Table 25).

There was no significant association between the number of long stayers in hospital and total admissions (X^2=12.8; v=11; p > 0.5).

TABLE 25 ADMISSION TO NEONATAL UNIT - 1986
LENGTH OF STAY BY MONTH OF ADMISSION
(Number and Percent)

MONTH	LENGTH OF STAY		TOTAL	Perc
	≤2 WEEKS	>2 WEEKS		
JANUARY	775 (93.9)	50 (6.1)	825 (100)	8.0
FEBRUARY	801 (95.6)	37 (4.4)	838 (100)	8.2
MARCH (95.7)	779 (4.3)	35 (100)	814	7.9
APRIL	778 (94.8)	43 (5.2)	821 (100)	8.0
MAY	809 (96.9)	26 (3.1)	835 (100)	8.1
JUNE	731 (95.7)	33 (4.3)	764 (100)	7.4
JULY	834 (96.2)	33 (3.8)	867 (100)	8.4
AUGUST	849 (95.3)	42 (4.7)	891 (100)	8.7
SEPTEMBER	916 (95.8)	40 (4.2)	956 (100)	9.3
OCTOBER	827 (94.9)	44 (5.1)	871 (100)	8.5
NOVEMBER	864 (95.0)	45 (5.0)	909 (100)	8.8
DECEMBER	849 (96.1)	34 (3.9)	883 (100)	8.6
TOTAL	9812 (95.5)	462 (4.5)	10274 (100)	100.0

2.3. Admissions Neonatal Unit 1986: According to Age Group - Totals and Deaths

Of the 10274 patients admitted to the unit during 1986, 10244 (99.7 %) were admitted within 24 hours of birth. 487 of this group subsequently died (4.8 %) (Table 26).

TABLE 26 ADMISSIONS TO NEONATAL UNIT - 1986
ACCORDING TO AGE GROUP (TOTAL AND DEATHS)
(Number and Percent)

AGE	ALIVE	DEAD	TOTAL	Perc
0 - 1 DAY	9757 (95.3)	487 (4.8)	10244 (100)	99.7
Over 1 DAY	29 (96.7)	1 (3.3)	30 (100)	0.3
TOTAL	9786 (95.3)	488 (4.7)	10274 (100)	100

2.4. Admissions Neonatal Unit 1986: Length of Stay According to Age Group

462 of the 10274 patients were admitted for a period of more than 14 days (4.5 % of cases) during 1986 (Table 27).

TABLE 27 ADMISSIONS TO NEONATAL UNIT - 1986
LENGTH OF STAY ACCORDING TO AGE GROUP
(Number and Percent)

AGE	LENGTH OF STAY		TOTAL	Perc
	≤2 WEEKS	>2 WEEKS		
0 - 1 DAY	9785 (95.5)	459 (4.5)	10244 (100)	99.7
Over 1 DAY	27 (90.0)	3 (10.0)	30 (100)	0.3
TOTAL	9812 (95.5)	462 (4.5)	10274	100

3. PROFILE OF DISORDERS TREATED

3.1. Profile of Disorders treated - Inpatients 1986 (Wards N1, N2) - Total and Deaths

For the 8147 patients admitted during 1986, 14735 conditions were coded (1.8 conditions per patient). Table 28 indicates the conditions which accounted for the majority of admissions. 2970 (20.2 %) patients were coded against International Classification of Diseases (ICD) codes 001-009, Intestinal Infections; 2311 (15.7 %) were assigned to the codes 480-487, Pneumonia and influenza; 1884 (12.8 %) against the codes 260 - 269, Nutritional Disorders and 885 (6.0 %) were assigned to codes 050 - 057, Viral Exanthems (mainly post/measles).

Some anomalies and probable errors occur in coding (congenital anomalies, perinatal conditions, pneumoconiosis) and the reader is referred to the discussion.

In paragraph 1.1 of this section, the overall death rate for the wards was stated to be 11.6 % of admissions. Apart from the Pneumonia and Influenza group (ICD 480 - 487) with a death rate of 11.1 % (257), the conditions mentioned above were associated with higher rates than the average: the rate for Intestinal Infections (ICD 001 - 009) was 15.8 % (468) *, Nutritional disorders 18.0 % (339), and Viral Exanthem (ICD 050 - 057) 17.9 % (158).

The highest death rate was associated with the ICD codes 030 - 041, mainly due to unspecified bacterial complications (34.6 %, 107).

TABLE 28 PROFILE OF DISORDERS TREATED
INPATIENTS 1986 (WARDS N1, N2)
TOTAL AND DEATHS
(Number and Percent)

DISEASE	CODE ICD	ALIVE (x)	DEAD (y)	PERC (y/x)	TOTAL	PERC TOTAL
INTESTINAL INFECTIONS	001-009	2502	468	15.8	2970	20.2
TUBERCULOSIS	010-018	318	20	5.9	338	2.3
ZOONOSIS	020-027	5	0	0.0	5	0.0
OTHER BACTERIAL INFECTIONS	030-041	202	107	34.6	309	2.1
VIRAL CNS, OTHER NON-ARTHROP	045-049	69	4	5.5	73	0.5
VIRAL - EXANTHEM	050-057	727	158	17.9	885	6.0
VIRAL - ARTHROPOD BORNE	060-066	1	0	0.0	1	0.0
OTHER - VIRAL, CHLAMYDIA	070-079	102	4	3.8	106	0.7
RICKETTSIA & OTHER ARTHROPOD	080-088	10	0	0.0	10	0.1
SYPHILIS AND OTHER STD	090-099	53	3	5.4	56	0.4
OTHER-SPIROCHAETE & MYCOSES	100-118	101	10	9.0	111	0.8
HELMINTHIASIS	120-129	201	5	2.4	206	1.4
OTHER INFECTION & PARASITIC	130-136	28	1	3.4	29	0.2
LATE EFFECTS-INFECT.,PARAS.	137-137	13	1	7.1	14	0.1
MALIGNANT NEOPLASIA	140-199	12	5	29.4	17	0.1
MAL. NEOPLASIA-LYMPH,BLOOD	200-208	99	11	10.0	110	0.7
BENIGN NEOPLASIA	210-229	5	2	28.6	7	0.0
CARCINOMA IN-SITU	230-234	0	0		0	0.0
THYROID CONDITIONS	240-246	3	0	0.0	3	0.0
OTHER ENDOCRINE	250-259	33	10	23.3	43	0.3
NUTRITIONAL DISORDERS	260-269	1545	339	18.0	1884	12.8
OTHER METABOLIC & IMMUNITY	270-279	286	81	22.1	367	2.5
BLOOD & BLOOD FORMING ORGANS	280-289	400	36	8.3	436	3.0

CONT.....

* Data available from the gastroenteritis ward indicates a similar figure of 16.3 % (see Objective 3).

TABLE 28 PROFILE OF DISORDERS TREATED ..CONTINUED

INPATIENTS 1986 (WARDS N1, N2)

TOTAL AND DEATHS

(Number and Percent)

... CONT

DISEASE	CODE ICD	ALIVE (x)	DEAD (y)	PERC (y/x)	TOTAL	PERC TOTAL
MENTAL DISORDERS	290-319	14	0	0.0	14	0.1
INFLAMMATORY C.N.S.	320-326	152	56	26.9	208	1.4
HEREDITARY & DEGENERATIVE CNS	330-337	42	3	6.7	45	0.3
OTHER C.N.S.	340-349	140	15	10.3	145	1.0
PERIPHERAL C.N.S.	350-359	25	2	7.4	27	0.2
EYE AND ADNEXA	360-379	60	3	4.8	63	0.4
EAR, MASTOID PROCESSES	380-389	120	2	1.6	122	0.8
ACUTE RHEUMATIC FEVER	390-392	24	2	7.7	26	0.2
CHR RHEUMATIC HEART DISEASE	393-398	77	9	10.5	86	0.6
HYPERTENSION,IHD & OTHER HD	401-429	162	46	22.1	208	1.4
ARTERIES, VEINS	430-459	22	6	21.4	28	0.2
ACUTE RESPIRATORY INFECTION	460-466	432	18	4.0	450	3.1
OTHER UPPER RESP INFECTION	470-478	16	1	5.9	17	0.1
PNEUMONIA & INFLUENZA	480-487	2054	257	11.1	2311	15.7
OBSTRUCTIVE, ALLIED DISEASE	490-496	112	1	0.9	113	0.8
PNEUMOCONIOSIS & OTHER	500-519	125	20	13.8	145	1.0
ORAL CAVITY, SALIVARY, JAW	520-529	7	0	0.0	7	0.0
OESOPHAGUS,STOMACH,DUODENUM	530-543	4	0	0.0	4	0.0
HERNIA,NON-INFECT ENTERITIS	550-558	14	1	6.7	15	0.1
OTHER INTESTINAL & PERITONEAL	560-569	78	11	12.4	89	0.6
OTHER DIGESTIVE	570-579	93	34	26.8	127	0.9
NEPHRITIS/-OSIS/-OTIC	580-589	254	21	7.6	275	1.9
OTHER URINARY	590-599	36	3	7.7	39	0.3
MALE GENITAL ORGANS	600-608	8	0	0.0	8	0.1
FEMALE -BREAST, PELVIC, OTHER	610-629	11	0	0.0	11	0.1
SKIN INFECTION & SUBCUTANEOUS	680-686	90	6	6.3	96	0.7
OTHER SKIN	690-709	64	5	7.2	69	0.5
ARTHROPATHIES,RHEUMATOID	710-720	30	1	3.2	31	0.2
OSTEOPATHIES, ACQUIRED MSS	730-739	10	1	9.1	11	0.1
CONGENITAL ANOMALIES	740-759	325	65	16.7	390	2.6
PERINATAL	760-779	656	155	19.1	811	5.5
SYMPTOMS ILL DEFINED	780-789	246	40	14.0	286	1.9
NON-SPEC. MORBIDITY,MORTALITY	790-799	2	0	0.0	2	0.0
INJURY & POISONING	800-959	52	3	5.5	55	0.4
POISONING-THERAPEUTIC AGENTS	960-979	32	0	0.0	32	0.2
POISONING-NON THERAPEUTIC	980-989	310	41	11.7	351	2.4
OTHER EXTERNAL	990-995	8	2	20.0	10	0.1
CHILD MALTREATMENT	995.5	18	1	5.3	19	0.1
OTHER COMPLICATIONS SUR/MED	996-999	6	3	33.3	9	0.1

3.2. Profile of Disorders Treated - Inpatients 1986 (Wards N1,N2) According to Length of Stay

The overall percentage of patients staying on the wards for more than 14 days was calculated as 30.0 %. Table 29 illustrates the rate for long stayers against the specific conditions. The four common groups accounting for the majority of diagnoses coded for had the following characteristics: Intestinal Infections (ICD 001 - 009) 31.1 % stayed for more than 14 days (923), Pneumonia and Influenza (ICD 480 - 487) 26.2 % (605), Nutritional Disorders (ICD 260 - 269) 54.1 %) and Viral Exanthems (ICD 050 - 057) 53.4 % (473).

There are many conditions which were associated with high length of stay features. It is difficult to draw conclusions about individual conditions without further close scrutiny, for example, the high stay rates of 57 to 62 percent associated with parasitic diseases is mainly because of their association with Nutritional disorders (which is the reason for the patients' longer than expected stay in hospital). The frequency, severity and / or chronicity of the other diseases must be taken into account.

TABLE 29 PROFILE OF DISORDERS TREATED
INPATIENTS 1986 (WARDS N1,N2) ACCORDING TO LENGTH OF STAY
(Number and Percent)

DISEASE	CODE ICD	LENGTH OF STAY ≤2 WEEK (x)	LENGTH OF STAY >2 WEEK (y)	LENGTH OF STAY PERC (y/x)	TOTAL	PERC TOTAL
INTESTINAL INFECTIONS	001-009	2047	923	31.1	2970	20.2
TUBERCULOSIS	010-018	172	166	49.1	338	2.3
ZOONOSIS	020-027	0	5	100.0	5	<0.1
OTHER BACTERIAL INFECTIONS	030-041	168	141	45.6	309	2.1
VIRAL CNS, OTHER NON-ARTHROP	045-049	59	14	19.2	73	0.5
VIRAL - EXANTHEM	050-057	412	473	53.4	885	6.0
VIRAL - ARTHROPOD BORNE	060-066	1	0	0.0	1	0.0
OTHER - VIRAL, CHLAMYDIA	070-079	61	45	42.5	106	0.7
RICKETTSIA & OTHER ATHROPOD	080-088	5	5	50.0	10	0.1
SYPHILIS AND OTHER STD	090-099	43	13	23.2	56	0.4
OTHER-SPIROCHAETE & MYCOSES	100-118	89	22	19.8	111	0.8
HELMINTHIASIS	120-129	81	125	60.7	206	1.4
OTHER INFECTION & PARASITIC	130-136	11	18	62.1	29	0.2

CONT ...

.... CONT

DISEASE	CODE ICD	LENGTH OF STAY <2 WEEK (x)	LENGTH OF STAY >2 WEEK (y)	LENGTH OF STAY PERC (y/x)	TOTAL	PERC TOTAL
LATE EFFECTS-INFECT.,PARAS.	137-137	6	8	57.1	14	0.1
MALIGNANT NEOPLASIA	140-199	6	11	64.7	17	0.1
MAL. NEOPLASIA-LYMPH,BLOOD	200-208	43	67	60.9	110	0.7
BENIGN NEOPLASIA	210-229	3	4	57.1	7	<0.1
CARCINOMA IN-SITU	230-234	0	0		0	0.0
THYROID CONDITIONS	240-246	2	1	33.3	3	<0.1
OTHER ENDOCRINE	250-259	30	13	30.2	43	0.3
NUTRITIONAL DISORDERS	260-269	865	1019	54.1	1884	12.8
OTHER METABOLIC & IMMUNITY	270-279	315	52	14.2	367	2.5
BLOOD & BLOOD FORMING ORGANS	280-289	230	206	47.2	436	3.0
MENTAL DISORDERS	290-319	10	4	28.6	14	0.1
INFLAMMATORY C.N.S.	320-326	88	120	57.7	208	1.4
HEREDITARY & DEGENERATIVE CNS	330-337	20	25	55.6	45	0.3
OTHER C.N.S.	340-349	93	62	42.8	145	1.0
PERIPHERAL C.N.S.	350-359	6	21	77.8	27	0.2
EYE AND ADNEXA	360-379	31	32	50.8	63	0.4
EAR, MASTOID PROCESSES	380-389	18	37	67.3	55	0.4
ACUTE RHEUMATIC FEVER	390-392	11	15	57.7	26	0.2
CHR RHEUMATIC HEART DISEASE	393-398	40	46	53.5	86	0.6
HYPERTENSION,IHD & OTHER HD	401-429	128	80	38.5	208	1.4
ARTERIES, VEINS	430-459	19	9	32.1	28	0.2
ACUTE RESPIRATORY INFECTION	460-466	407	43	9.6	450	3.1
OTHER UPPER RESP INFECTION	470-478	12	5	29.4	17	0.1
PNEUMONIA & INFLUENZA	480-487	1706	605	26.2	2311	15.7
OBSTRUCTIVE, ALLIED DISEASE	490-496	89	24	21.2	113	0.8
PNEUMOCONIOSIS & OTHER	500-519	79	66	45.5	145	1.0
ORAL CAVITY, SALIVARY, JAW	520-529	5	2	28.6	7	<0.1
OESOPHAGUS,STOMACH,DUODENUM	530-543	2	2	50.0	4	<0.1
HERNIA,NON-INFECT ENTERITIS	550-558	5	10	66.7	15	0.1
OTHER INTESTINAL & PERITONEAL	560-569	60	29	32.6	89	0.6
OTHER DIGESTIVE	570-579	78	49	38.6	127	0.9
NEPHRITIS/-OSIS/-OTIC	580-589	221	54	19.6	275	1.9
OTHER URINARY	590-599	18	21	53.8	39	0.3
MALE GENITAL ORGANS	600-608	5	3	37.5	8	0.1
FEMALE -BREAST, PELVIC, OTHER	610-629	6	5	45.5	11	0.1
SKIN INFECTION & SUBCUTANEOUS	680-686	66	30	31.3	96	0.7
OTHER SKIN	690-709	41	28	40.6	69	0.5
ARTHROPATHIES,RHEUMATOID	710-720	15	16	51.6	31	0.2
OSTEOPATHIES, ACQUIRED MSS	730-739	4	7	63.6	11	0.1
CONGENITAL ANOMALIES	740-759	285	105	26.9	390	2.6
PERINATAL	760-779	722	89	11.0	811	5.5
SYMPTOMS ILL DEFINED	780-789	227	59	20.6	286	1.9
NON-SPEC. MORBIDITY,MORTALITY	790-799	1	0	0.0	2	<0.1
INJURY & POISONING	800-959	36	19	34.5	55	0.4
POISONING-THERAPEUTIC AGENTS	960-979	28	4	12.5	32	0.2
POISONING-NON THERAPEUTIC	980-989	294	57	16.2	351	2.4
OTHER EXTERNAL	990-995	9	1	10.0	10	0.1
CHILD MALTREATMENT	995.5	9	10	52.6	19	0.1
OTHER COMPLICATIONS SUR/MED	996-999	5	4	44.4	9	0.1

3.3. Profile of Disorders Treated - Inpatients 1986 (Neonatal Unit) Total and Deaths

22529 conditions were coded for the Neonatal Unit, 1986 (Table 30). This was for 10274 admissions, with a rate of 2.2 conditions per patient. The vast majority were in the group ICD code 760 (34.0%), Newborn Affected By Maternal Conditions (7661). The second highest group (24.0 %) Newborn, Complications of Labour ICD 763 was coded for 5413 patients. [NB. The group of patients which were subject to consultation in the Unit (+/- 4000) and not formal admission were mostly categorized under these two headings. These were mainly related to mothers whose blood grouping were Rhesus negative, or who were positive on syphilis serology, or who suffered from pregnancy induced hypertension and similar conditions ; consultation was for opinion or prescription of treatment only.] Short gestation ICD 765 accounted for 1863 cases (8.3 %), birth trauma ICD 767 for 1667, 7.4 %, hypoxia ICD for 768 1196, 5.3 %, and Respiratory distress Syndrome ICD 770 for 1144, 5.1 %. Many of these conditions presented together - see discussion.

Among these common presentations, the death rate varied widely, from 19.3 % (221) for Respiratory Distress Syndrome (associated with the 17.7 % (330) recorded for the Short Gestation and 11.3 % (135) for the Hypoxia categories) to 1.0 % for Complications of labour.

The highest death rate was for Neonatal Haemorrhage (59.5 %, 44 of 74 cases).

TABLE 30 PROFILE OF DISORDERS TREATED - INPATIENTS 1986 (NEONATAL UNIT)
TOTAL AND DEATHS
(Number and Percent)

DISEASE	CODE ICD	ALIVE (x)	DEAD (y)	PERC (y/x)	TOTAL	PERC TOTAL
NEWBORN - MATERNAL CONDITIONS	760	7569	92	1.2	7661	34.0
NEWBORN-COMPLIC. OF PREGNANCY	761	3	1	25.0	4	<0.1
NEWBORN-COMPLIC. OF PLACENTA	762	48	5	9.4	53	0.2
NEWBORN-COMPLIC. OF LABOUR	763	5359	54	1.0	5413	24.0
SLOW FETAL GROWTH/MALNUTRITION	764	398	7	1.7	405	1.8
SHORT GESTATION <1000 gms	765	1533	330	17.7	1863	8.3
LONG GESTATION & HIGH BIRTH WT	766	186	0	0.0	186	0.8
BIRTH TRAUMA	767	1609	58	3.5	1667	7.4
HYPOXIA - BIRTH, INTRAUTERINE	768	1061	135	11.3	1196	5.3
RESPIRATORY DISTRESS SYNDROME	769	923	221	19.3	1144	5.1
OTHER RESPIRATORY OF NEWBORN	770	761	157	17.1	918	4.1
SPECIFIC PERINATAL INFECTIONS	771	349	33	8.6	382	1.7
NEONATAL HAEMORRHAGE	772	30	44	59.5	74	0.3
HAEMO. DISEASE-ISOIMMUNIZATION	773	44	5	10.2	49	0.2
OTHER PERINATAL JAUNDICE	774	877	11	1.2	888	3.9
ENDOCRINE / METABOLIC	775	300	18	5.7	318	1.4
HAEMATOLOGICAL DISORDERS	776	13	1	7.1	14	0.1
DIGESTIVE SYSTEM	777	8	8	50.0	16	0.1
DISORDERS INTEGUMENT / TEMP.	778	103	25	19.5	128	0.6
OTHER	779	145	5	3.3	150	0.7

3.4. Profile of Disorders Treated - Inpatients 1986 (Neonatal Unit) According to Length of Stay

The overall percentage of admissions who stayed for over 14 days (Paragraph 2.1 refers) was 4.5 % (462). For the six commonest conditions coded, the longer stay rate varied widely, from 2.1 % (115) for Complications of Labour ICD 763, to 20.3 % (232) for Respiratory distress Syndrome ICD 769. Long stay was associated with 15.0 % of the Short Gestation cases (279). The latter two categories were the only conditions among the majority coded which were markedly above the mean high length of stay (Table 31).

The highest group (length of stay more than 14 days) was recorded for the Haemolytic Disorders - Isoimmunization, with a rate of 28.6 % (14 of 35 cases).

TABLE 31 PROFILE OF DISORDERS TREATED - INPATIENTS 1986 (NEONATAL UNIT)
ACCORDING TO LENGTH OF STAY
(Number and Percent)

DISEASE	CODE ICD	LENGTH OF STAY			TOTAL	PERC TOTAL
		≤2 WEEK (x)	>2 WEEK (y)	PERC (y/x)		
NEWBORN - MATERNAL CONDITIONS	760	7493	168	2.2	7661	34.0
NEWBORN-COMPLIC. OF PREGNANCY	761	4	0	0.0	4	<0.1
NEWBORN-COMPLIC. OF PLACENTA	762	52	1	1.9	53	0.2
NEWBORN-COMPLIC. OF LABOUR	763	5298	115	2.1	5413	24.0
SLOW FETAL GROWTH/MALNUTRITION	764	395	10	2.5	405	1.8
SHORT GESTATION <1000 gms	765	1584	279	15.0	1863	8.3
LONG GESTATION & HIGH BIRTH WT	766	184	2	1.1	186	0.8
BIRTH TRAUMA	767	1610	57	3.4	1667	7.4
HYPOXIA - BIRTH, INTRAUTERINE	768	1116	80	6.7	1196	5.3
RESPIRATORY DISTRESS SYNDROME	769	912	232	20.3	1144	5.1
OTHER RESPIRATORY OF NEWBORN	770	856	62	6.8	918	4.1
SPECIFIC PERINATAL INFECTIONS	771	341	41	10.7	382	1.7
NEONATAL HAEMORRHAGE	772	70	4	5.4	74	0.3
HAEMO. DISEASE-ISOIMMUNIZATION	773	35	14	28.6	49	0.2
OTHER PERINATAL JAUNDICE	774	760	128	14.4	888	3.9
ENDOCRINE / METABOLIC	775	185	33	10.4	318	1.4
HAEMATOLOGICAL DISORDERS	776	13	1	7.1	14	0.1
DIGESTIVE SYSTEM	777	15	1	6.3	16	0.1
DISORDERS INTEGUMENT / TEMP.	778	107	21	16.4	128	0.6
OTHER	779	143	7	4.7	150	0.7

Discussion:

1. ADMISSIONS:

1.1. Admissions to the Paediatric Wards (N1, N2)

The months January to May account for the highest **admission** numbers, but this is less marked than in previous years. This pattern in overall numbers of admissions is not marked in 1986; this change in the seasonal variation has been occurring since 1981 and may indicate that the demand for admission has increased in particular months with a corresponding decrease in other months (the overall admissions having increased only slightly over this period of time). This is highly unlikely when one considers the overall bed occupancy status (Objective 3); what is probably occurring is that the overall demand has increased, but the capacity of the hospital to accommodate this increase has been exceeded.

The **death rate** (expressed as a percentage of admissions) was 11.6 % overall. This is high when compared to the hospital death rate of 3.8 % for 1986. It is even more significant when one considers the disease specific rates.

The significant increased deaths (in relation to the number of admissions) occurring in January (12.1 % of **January admissions)** may have several explanations: new and inexperienced staff taking over at a time of high admissions may play a major role (this tends to be supported by the lower than expected rates found in December, November and October - the end of the registrar period). The severity of the gastroenteritis 'season' is also to be considered. But the high bed occupancy rate (see Objective) must be taken into account in this regard because of the consequential workload and because of the infectious nature of many of the major presenting conditions.

The **1 to 11 month age group** constituted the largest number of admissions to the wards. This group also experienced a significantly higher than expected death rate (in relation to admissions). This could reflect the severity of the presenting diseases and the quality of care provided for this group of patients.

The importance of the lack of association between the numbers of **longer staying patients** and the total admissions must be noted. This implies that patients needing longer term care are being catered for. This factor is further considered in the in-depth study of the selected conditions.

Significantly more patients **over 1 year of age** stayed in for longer than 2 weeks. This is the group which is mainly affected by the complications of, and longer therapy required for, malnutrition (see Profile of Conditions).

1.2. Admissions to the Neonatal Unit

Admissions to the Neonatal Unit are in the main from the King Edward VIII Hospital Obstetrical Unit and the majority are admitted during the first day of life. The **monthly admissions** are therefore fairly constant (average of 956 per month). [NB This includes the group of patients (average 333 per month) who were not formally admitted to the Unit.]

The overall **death rate** for 1986 was 4.8 % of admissions (trends in this department are analyzed in Objective). There was uniformity in the death rates over the months when compared to the number of admissions.

The **length of stay** characteristics were also constant over the months of 1986.

These factors taken together indicate that the patients present with conditions of similar type and severity over the months. The service offered is likewise apparently uniform, and subject to a constant degree of training and control.

1.3. Perspective

The characteristics of King Edward VIII Hospital are remarkably similar to those of the more rural hospitals in Southern Africa [13] [14], where the majority of deaths are caused by preventable conditions like protein energy malnutrition (usually complicated by infections), chest infections, gastroenteritis and prematurity / low birth weight. Most are under the age of 1 year and almost all under the age of 5 years.

It is noted that worldwide, it is estimated that more than 11,000 children die daily from acute respiratory infections [15]. These acute infections are the prime reason for out-patient attendances and account for 20 to 40 % of admissions, with the annual admissions for pneumonia being much greater in developing as opposed to developed countries.

2. PROFILE OF DISORDERS TREATED - INPATIENTS WARDS N1, N2 - 1986

Three of the **four main conditions** coded for (gastroenteritis, pneumonia and viral exanthems) are caused by infections or their complications. The severity of each is made worse by the presence of the fourth condition (malnutrition). They could all be positively affected by the use of efficient and effective primary health services outside of the hospital situation and as such are largely preventable.

The **death rates** associated with these conditions are high (ranging from 18.0 % for Nutritional disorders, 17.9 % for Viral Exanthems, and 15.8 % for gastroenteritis to 11.1 % for Pneumonia. Except for the pneumonia group, these are well above the overall rate of 11.6 %. These high rates are explained in part by the fact that these conditions often occur

together. The overall rate of about 2 **conditions per patient** recorded is mainly accounted for in this manner. They are generally acute conditions and occurring, as has been demonstrated, in the young child, are usually severe and need intensive treatment. Skilled rehydration and control of body electrolytes is particularly essential. (This has long been recognised and is the reason behind the Procedures and Resuscitation Unit (PRU)- intended to operate as a high care area, preparing a patient prior to admission or discharge from the outpatients department.)

The **length of stay** characteristics for the specific conditions emphasizes the impact that the infectious diseases and particularly the underlying disorders of malnutrition and measles have on the hospital service. While on average 30.1 % of patients stayed in hospital for more than 14 days, those cases associated with malnutrition and measles had much higher percentages (54.1 % and 53.4 % respectively). This is because they complicate and predispose to other serious conditions, and because of their need for initial rehabilitation.

Some anomalies appear in the data received from the Medical Records Department - congenital abnormalities, perinatal disease, pneumoconiosis. There is no doubt that errors occur in coding. The coding is conducted by senior clerical staff in the records department. They have gained a reasonably good insight into the system, but they have no profession training. The coding is largely based on an interpretation of the **words** contained in the medical record. Laboratory reports are scrutinized along with any other available documentation and taken at face value. Errors are unavoidable in this system. While the Paediatric Department specialists are involved in encoding all of their inpatients, this process takes place after the record department has finished with the record - the delays in reversing the order of record scrutiny have not made it possible for the coding to be done prior to entry onto the hospital computer. Subsequent changes are not often communicated and therefore not adjusted for.

3. PROFILE OF DISORDERS TREATED - NEONATAL UNIT - 1986

Most conditions presenting in the newborn require immediate and often specialized care. Any difficulties in this phase of life are likely to have serious long term effects or result in death. The overall death rate for this unit was 4.8 % of admissions for 1986. This is a marked improvement on previous statistics and is discussed under Objective 3.

Some disorders are not readily amenable to therapy (eg neonatal haemorrhage ICD 772; death rate 54.9 % of patients), but one of the recurring themes is prematurity. The impact prevention of premature birth could have on the profile of neonatal disorders would be enormous.

The majority of conditions coded for are in the codes ICD 760 to 763 (58 %). Many of these are from the group who were only examined and not admitted; many of these codes were also used in association with other codes and as a general descriptor for the newborn where no obvious illness was noted. The general comments with respect to coding mentioned above also apply here.

Respiratory conditions (ICD 768 to 770; 14.5 %) mainly in the premature infant (ICD 765; 8.3 %) are the other **prominent conditions** treated. These also account for the highest death rates (Respiratory Distress Syndrome (ICD 769; 19.3 %; 221 of 1144 cases).

The respiratory disorders and prematurity are also responsible for the **longer staying patients.** Other major contributors are jaundice (again associated with prematurity) and haemolytic (isoimmunization) disorders.

Survey of Selected Conditions - Outpatients (OBJECTIVE 2 (c))

Purpose :

To match aspects of the process of care in the Outpatient Department with pre -determined standards of practice.

Definitions :

1. Aspects of the process of care.
   This refers to some of the activities and services undertaken in the Outpatient Department. The committee selected three conditions which were to be assessed, namely gastroenteritis, pneumonia and malnutrition. Activities relating to the diagnosis, treatment and admission or discharge of these conditions were considered as 'aspects of the process of care'.

2. Pre - determined standards of practice.
   The aspects of the process of care identified above were detailed and a set of criteria of the standards expected to be achieved and / or recorded was drafted in conjunction with the committee.

Method :

An initial analysis of the Paediatric Departments' computer data for the year 1985 was assessed to assist in the selection of the conditions to be studied. Three were selected by the committee because of the prevalence, morbidity and mortality records of the conditions.

The criteria protocols were then drafted by the researcher, in conjunction with Senior Specialists in the Department. These were subsequently discussed and amended by the committee. The criteria consisted of a protocol of minimum requirements expected of the personnel and department in the taking of a history, examining the patient and performing any other investigation required in order to arrive at a diagnosis. Minimum requirements were stated for the management of the patient and the prescribing of medications, including aspects which would be considered to be excessive, unwarranted or counter productive. Admission, discharge and transfer criteria were particularly detailed. (See Appendices 6 to 8).

Collation checklists were then compiled for each condition by the researcher. A pilot study was undertaken and minor amendments to the protocol and checklists were made.

SAMPLE: Once the completed Outpatient questionnaires were available following the Utilization Study week, **all** the relevant outpatient records (i.e. those patients with one or more of the selected conditions) were listed in numerical order. Every second record was then selected for inclusion in this part of the study. Each of these records was then drawn and the records matched against the criteria protocol for the appropriate condition by the researcher. The results were entered directly onto collation checklists and analyzed.

Limitations of the Study :

Several problems were anticipated before the study began and several others became apparent during the investigation. Many reasons accounted for this, among which was the fact that this was a new technique to the researcher and department. The method was a compromise between a quick screen of the records and a detailed evaluative analysis.

1. The consensus method used to derive the criteria protocol meant that two needs had to be addressed, those of the researcher and the department. This resulted (in some cases) in similar data groups being collected in different ways (and therefore not comparable between the conditions chosen). More data was gathered than was probably necessary to fulfil the objectives.

2. Because of the short time available and the fact that only one researcher was involved, it was necessary to reduce the number of records screened to fifty percent of the patients recorded. The problem of missing records and incorrect initial marking of the diagnoses on the Utilization Questionnaires resulted in 73.9 % of this sample being used in the final analysis. This is discussed in detail in Appendices 4 and 5.

3. The lack of certain recording detail in the records and missing information in some instances was anticipated; this has been quantified during the study.

The results of the study, however, are considered valid for the Outpatient department in relation to the conditions studied.

Reduction of Bias :

1. The criteria were arrived at in conjunction with the department committee.

2. Changes in applying the criteria were gauged (in part) by analyzing and comparing the data collected in the different conditions studied- reference is made to this in the text.

3. The staff in the Outpatient Department were not made aware of the criteria which were to be used in the evaluation.

Results

DEFINITIONS

Three conditions were included in the study, namely Pneumonia, Gastroenteritis and Protein Energy Malnutrition. Because of the clinic setting in which this part of the study was undertaken, clinical definitions had to included in the definition of the conditions to some degree. Thus, Protein Energy Malnutrition was defined as any case with a mass less than the 3rd centile for age, or obvious kwashiorkor in cases where the mass may be misleading. Pneumonia included any case of broncho- or lobar- pneumonia, preferably confirmed by x-ray (of the 98 cases, 80 were confirmed on x-ray, 13 were not confirmed and 5 had no x-ray taken or it was not available for some reason eg transferred / admitted directly). Gastroenteritis was defined as mild to severe dehydrating diarrhoea, with or without vomiting.

The results tabulated here are a summary, grouped according to the criteria categories; the selected conditions, if applicable, are dealt with under each heading.

The assessments have been made in terms of the specific case firstly being applicable or not (for example, if the infant was less than four months of age or admitted in a critical condition at night, immunization was not applicable and the case was not therefore included at that criteria level).

Secondly, if the case was to be included, a comparison was made with the criteria and assessed as complying with these criteria or not. Thirdly, if the information needed to make the assessment was not available, missing or the record was illegible or no record could be found, then this was marked

as 'unable to assess'. The whole record was considered (doctors notes, nurses charts and notes, investigation forms and even notes scribbled on the cover !).

It is important to note that ALL APPLICABLE RECORDS ARE INCLUDED in the study. This means that the number of cases which complied with the criteria and the number of cases which did not comply are a statement of the MINIMUM number of each of these groups which would occur if all the information were available. (If the information became available to enable the complete analysis of all applicable records, the latter groups could not decrease in amount.)

1. ADMISSIONS

1.1. Pneumonia

Of the 98 patients included in the survey, 18 (18.4 %) were admitted, 55 (56.1 %) were observed under treatment (not necessarily in the Resuscitation Unit), and 25 (25.5 %) were treated as outpatients de nova (Table 32).

According to the admission criteria, 29 patients should have been admitted. This includes 11 patients who were observed under treatment. The major reasons necessitating admission were because of the presence of complications (eg other disease entities such as gastroenteritis).

50 of the 55 patients observed (90.9 %) could not be assessed using the criteria of respiration rate. In fact, an overall total of only 14 cases had a record of respiration rate. The 11 patients mentioned above are included in this group (ie 20.0 % of those observed) - other complications were responsible for their being considered as needing admission.

24 of the 25 patients treated as outpatients de nova were also not able to be assessed according to the criteria, because of no record of respiration rate.

1.2. Gastroenteritis

The criteria as applied here relate to admissions **after** having been treated in the Procedures and Resuscitation Unit. 142 patients were included for this condition, 15 of whom (10.6 %) were admitted. A further 32 were considered as not complying with the criteria (22.5 %). The majority of these (31, 21.8% of total) were considered to need admission, but were not admitted. The other 1 case was admitted unnecessarily according to the criteria (Table 33).

The major reasons for considering admission necessary were because of complications relating to other infections and metabolic disturbances. the second major group was related to association with undernutrition.

1.3. Protein Energy Malnutrition

Of the 33 patients in this group, 8 were admitted (24.2 %). A further 13 (39.4 %) were considered as not complying with the criteria, that is, were not admitted and should have been (Table 34).

The major reason recorded as the need for admission was concurrent gastroenteritis.

TABLE 32 PNEUMONIA ATTENDANCES
SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
ADMISSIONS	16	(55.2)	1	(3.4)	12	(31.4)	29	(100)
OBSERVED	3	(5.5)	50	(90.9)	2	(3.6)	55	(100)
OPD De Nova	1	(4.0)	24	(96.0)	0		25	(100)

TABLE 33 GASTROENTERITIS ATTENDANCES

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
104	(73.3)	6	(4.2)	32	(22.5)	142	(100)

TABLE 34 PROTEIN ENERGY MALNUTRITION ATTENDANCES

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
20	(60.6)	0		13	(39.4)	33	(100)

2. INVESTIGATIONS

2.1. Pneumonia

Of the 99 applicable records regarding investigations, 96 (97.0%) complied with the criteria (Table 35). 3 records did not (3.0 %): these were cases treated as pneumonia without the confirmation of a chest radiograph.

2.2. Gastroenteritis

Of the 70 applicable records, 51 (72.8 %) complied with the criteria. 13 records did not comply (18.6 %): the majority of these (12) were in respect of electrolyte monitoring **prior** to admission (Table 36).

2.3. Protein Energy Malnutrition

Of the 108 applicable records, 46 (42.6 %) complied with the criteria. 57.4 % did not comply (62): these were mainly in respect of the monitoring of haemoglobin, blood glucose and stool parasites, and the drawing of blood for culture prior to antibiotic use, in conditions where this was indicated (Table 37).

TABLE 35 INVESTIGATIONS - PNEUMONIA

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
96	(97.0)	0		3	(3.0)	99	(100)

TABLE 36 INVESTIGATIONS - GASTROENTERITIS

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
51	(72.8)	6	(8.6)	13	(18.6)	70	(100)

TABLE 37 INVESTIGATIONS - PROTEIN ENERGY MALNUTRITION

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
42	(46.2)	0		49	(53.3)	91	(100)

3. IMMUNIZATION

3.1. Pneumonia

Of the 55 applicable cases (40.0 %) complied with the criteria (22), while 23 (41.8 %) were not able to be assessed because of lack of any written record regarding measles vaccine administration. The 10 other cases (18.2 %), considered not to have complied, relate specifically to hyperimmunoglobulin administration (no record of administration in cases where this was indicated). Table 38 refers.

3.2. Gastroenteritis

42 of the 107 applicable cases (39.2 %) complied with the criteria, while 37.4 % had no record of vaccine administration (40) and 23.4 % had no record of immunoglobulin administration where these may be applicable (25) (Table 38).

3.3. Protein Energy Malnutrition

Of the 21 applicable cases, 9 (42.9 %) complied with the criteria, while the remaining 12 (57.1 %) had no record of measles or measles vaccine status (Table 38).

TABLE 38 IMMUNIZATIONS

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
PNEUMONIA	22	(40.0)	23	(41.8)	10	(18.2)	55	(100)
G.ENTERITIS	42	(39.2)	40	(37.4)	25	(23.4)	107	(100)
P.E.MAL	9	(42.9)	12	(57.1)	0		21	(100)

TABLE 39 ANTIBIOTIC CRITERIA - PNEUMONIA

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
95	(100)	0		0		95	(100)

TABLE 40 ANTIBIOTIC CRITERIA - GASTROENTERITIS

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
87	(64.9)	1	(0.8)	46	(34.3)	134	(100)

TABLE 41 ANTIBIOTIC CRITERIA - PROTEIN ENERGY MALNUTRITION

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
11	(52.4)	2	(9.5)	8	(38.1)	21	(100)

4. ANTIBIOTIC TREATMENT PROCEDURES

4.1. Pneumonia

All 98 cases complied with the criteria (Table 39).

In only 1 case was more than a single antibiotic used for pneumonia alone (and this was part of an admission procedure).

4.2. Gastroenteritis

Of the 134 cases, 87 (64.9 %) complied with the criteria (Table 40). 46 (34.3 %) did not comply. The majority of these related to the category of administration of antibiotics unnecessarily (33, 71.8 % of the 46) and not complying with the routine requirements of investigation prior to administration of antibiotics (12, 26.1 % of the 46).

4.3. Protein Energy Malnutrition

11 of the 21 applicable cases complied with the criteria (52.4 %). 8 did not comply (38.1 %): these were in respect of not complying with the routine requirements of investigation prior to administration of antibiotics (Table 41).

5. TREATMENT FOR DEHYDRATION

5.1. Doctors Orders

Table 42 refers.

In only 9 records assessed for dehydration was the method and quantity of fluids ordered recorded. This was out of 23 records for pneumonia, 121 for gastroenteritis and 15 for malnutrition, although these also include those cases which had a combination of these conditions. These orders are written on fluid / treatment sheets which do not form a permanent part of the record.

5.2. Doctors Assessment of Dehydrated Cases.

The applicable cases here were those with moderate or severe ration. Of the 17 cases with pneumonia, 9 (52.9 %) complied with the criteria and 8 (47.1 %) were not able to be assessed because of lack of recorded data (Table 43).

The 103 gastroenteritis cases included 71 which complied with the criteria (68.9 %) and 24 (23.3 %) which were not assessable, while 8 (7.8 %) did not comply.

15 cases from the protein energy malnutrition group were assessed here. 8 (53.3 %) complied with the criteria, 4 (26.7 %) could not be assessed and 3 (20.0 %) did not comply

TABLE 42 TREATMENT FLUIDS - ORDERS

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
PNEUMONIA	0		23	(100)	0		23	(100)
G.ENTERITIS	8	(6.6)	113	(93.4)	0		121	(100)
P.E.MAL	1	(6.7)	14	(93.3)	0		15	(100)

TABLE 43 TREATMENT FLUIDS - ASSESSMENT

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
PNEUMONIA	9	(52.9)	8	(47.1)	0		17	(100)
G.ENTERITIS	71	(68.9)	24	(23.3)	8	(7.8)	103	(100)
P.E.MAL	8	(53.3)	4	(26.7)	3	(20.0)	15	(100)

6. OXYGEN THERAPY PRIOR TO ADMISSION - PNEUMONIA CASES

61 of the 66 (92.4 %) cases where oxygen therapy may have been applicable could not be assessed because no record was found in these notes with reference to oxygen therapy (Table 44).

TABLE 44 OXYGEN THERAPY - PNEUMONIA

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
2	(3.0)	61	(92.4)	3	(4.6)	66	(100)

7. RESUSCITATION WITH RESPECT TO ANAEMIA AND / OR HYPOGLYCAEMIA-MALNUTRITION CASES

24 out of the 26 cases (92.3 %) where resuscitation in this respect may have been applicable were not able to be assessed because of no record of haemoglobin or glucose monitoring (Table 45).

TABLE 45 RESUSCITATION MEASURES - PROTEIN ENERGY MALNUTRITION

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
0		24	(92.3)	2	(7.7)	26	(100)

8. NURSE MONITORING

8.1. Pneumonia

None of the 64 records included could be assessed according to the criteria because of lack of documentation (Table 46).

8.2. Gastroenteritis and Protein Energy Malnutrition

Of the 142 gastroenteritis cases included in this section, 27 (19.0 %) complied with the criteria, whilst 101 records (71.1 %) did not contain the necessary documentation to enable assessment to be carried out. 14 (9.9 %) did not comply with the criteria (Table 47).

The same criteria were used for malnutrition cases: 50.0 % of these cases (16) did not have the required documentation but 15 (46.9 %) complied with the criteria (Table 47).

TABLE 46 NURSE MONITORING - PNEUMONIA

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
0		64	(100)	0		64	(100)

TABLE 47 NURSE MONITORING - GASTROENTERITIS AND PROTEIN ENERGY MALNUTRITION

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
G.ENTERITIS	27	(19.0)	101	(71.1)	14	(9.9)	142	(100)
P.E.MAL	15	(46.9)	16	(50.0)	1	(3.1)	32	(100)

9. FIT FOR DISCHARGE

9.1. Clinical

45.3 % of the pneumonia cases (29 of the 64 applicable cases) complied with the criteria, 42.2 % (27) were not able to be assessed and 12.5 % (8) of the cases did not comply (Table 48).

In respect of gastroenteritis cases, 88 of the 107 applicable cases (82.3 %) complied with the criteria, while only 1 case did not. 18 records could not be assessed (16.8 %) (Table 48).

In the protein energy malnutrition group only 3 cases were discharged from care and none of these could be assessed because of lack of recorded data.

TABLE 48 FIT FOR DISCHARGE - CLINICAL

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
PNEUMONIA	29	(45.3)	27	(42.2)	8	(12.5)	64	(100)
G.ENTERITIS	88	(82.3)	18	(16.8)	1	(0.9)	107	(100)

9.2. Fit for Discharge - Electrolytes

Only gastroenteritis cases were involved in this aspect of the review. Of the 43 cases included, 13 (30.2 %) did not comply with the criteria for discharge, 22 (51.2 %) could not be assessed because of missing data, while only 8 (18.6 %) complied (Table 49).

TABLE 49 FIT FOR DISCHARGE - ELECTROLYTES

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
G.E.ENTERITIS	8	(18.6)	22	(51.2)	13	(30.2)	102	(100)

10. FOLLOW UP CHEST

10.1. Chest X-rays

X-ray data for follow up cases of pneumonia was assessed for 26 cases, 25 of which (96.2 %) complied with the established criteria (Table 50).

10.2. Education Given

Education details given to the gastroenteritis and malnutrition cases was largely unrecorded and therefore not assessable (97.6 % and 81.5 % respectively) (Table 51).

10.3. Follow up Arrangements

In regard to the follow up arrangements for the 124 applicable cases, 103 could not be assessed because of lack of documentation (83.1 %) and 21 (16.9%) complied with the set criteria (Table 52).

18 of the applicable 27 cases of protein energy malnutrition included (66.7 %) complied with the criteria and 8 (29.6 %) could not be assessed.

TABLE 50 FOLLOW UP CXR - PNEUMONIA

SELECTED CONDITIONS - OUTPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
No.	(%)	No.	(%)	No.	(%)	No.	(%)
25	(96.2)	0		1	(3.8)	26	(100)

TABLE 51 FOLLOW UP - EDUCATION

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
G.ENTERITIS	3	(2.4)	121	(97.6)	0		124	(100)
P.E.MAL	5	(18.5)	22	(81.5)	0		27	(100)

TABLE 52 FOLLOW UP - ARRANGEMENTS

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
G.ENTERITIS	21	(16.9)	103	(83.1)	0		124	(100)
P.E.MAL	18	(66.7)	8	(29.6)	1	(3.7)	27	(100)

11. SUMMARY OF WHOLE ASSESSMENT

The overall assessment of the three conditions included in the study are shown in Table 53.

539 main factors were included in the Pneumonia cases, of which 221 (41.0 %) complied with the criteria, 281 (52.1 %) could not be assessed, and 37 (6.9 %) did not comply with the criteria.

1056 main factors were reviewed in the gastroenteritis cases, of which 442 (41.9 %) complied with the criteria, 450 (42.6 %) could not be assessed, and 164 (15.5 %) did not comply.

249 main factors were reviewed in the Protein Energy Malnutrition cases, of which 95 (38.0 %) complied with the criteria, 100 (40.2 %) could not be assessed, and 54 (26.8 %) did not comply.

TABLE 53 OVERALL ASSESSMENT FIGURES

SELECTED CONDITIONS - OUTPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
PNEUMONIA	221	(41.0)	281	(52.1)	37	(6.9)	539	(100)
G.ENTERITIS	442	(41.9)	450	(42.6)	164	(15.5)	1056	(100)
P.E.MAL	95	(38.0)	100	(40.2)	54	(26.8)	249	(100)

Discussion : Selected Conditions Outpatients

The reason for measuring aspects of the process of care against accepted standards of practice is to objectively assess the quality of care provided. In the context of this study and specifically in respect of outpatients, the discussion will be framed to answer the following questions:-

1) Are patients not being admitted to the wards who should be admitted ?

2) Are specific goals relating to certain investigations and procedures and aspects of therapy being met ?

3) Are specific goals being met prior to discharge from outpatient care ?

The three selected conditions (Pneumonia , Gastroenteritis and Protein Energy Malnutrition) accounted for a large percentage (37,5 %) of the outpatient attendances during the study period and also represent the majority of the most severely ill. It must again be emphasized that the number of cases which complied or did not comply with the criteria represent a MINIMUM number (if information were available for the groups which could not be assessed, these groups would not decrease; this is therefore a measure of the **minimum compliance or non-compliance.** The results for the individual conditions cannot be summated, however, because the conditions are often present in the same patient.

1. CRITERIA RELATING TO ADMISSION OF CASES TO THE WARDS.

Pneumonia: Because of the anticipated difficulties which patients experience in obtaining treatment in their local situation (at home, clinics) and the large number of cases, the department has devised a system of dealing with the pneumonia cases according to the severity of presentation. 'Mild' cases are given initial therapy and are prescribed oral therapy to be taken at home; more severely ill are prescribed parenteral therapy while under observation in the department (this period is variable depending on the condition and response of the patient to the therapy - this may be from 8 to 24 hours or more). These children are cared for by the accompanying adult; during the day they nurse the children on their laps, but at night are provided with a floor mattress and a meal. The very ill are admitted; if complicated by dehydration, they are often admitted to the Procedures and Resuscitation Unit.

The major criteria for deciding into which group these cases fall are the clinical severity of the pneumonia (such as cyanosis or history of cyanosis) and the presence or absence of complicating conditions (such as dehydrating gastroenteritis). The respiratory rate of the child is also taken into account as a MAJOR sign [16]. However, only 14 of the 98 cases (14.3 %) had a record of the respiratory rate. The general routine (apart from the medical recording) is for the nursing staff to record the respiratory rate of those patients who are retained under observation, but the majority of these records were not available for assessment. This means that one of the major criteria for assessing severity of pneumonia cases is not adequately recorded in the permanent record.

Using the criteria for admission, it was determined that 29 patients should have been admitted (a total of 30.9 % of pneumonia cases). Only 18 cases were actually admitted; an additional 11 % of pneumonia cases could warrant admission according to the criteria (Appendix refers; an estimated additional 28 patients per week). If the respiratory rate were available for the observed group of patients, it is probable that this estimate would increase substantially (if only 50 % of the observed cases did require admission based on this criteria, it would represent a further 23.4 % (56/week) of additional admissions (a total of 54.3 % of pneumonia cases).

Gastroenteritis: The criteria of admission to the wards was applied after processing through the PRU (over 24 hours of care in some cases). Additional cases needing admission were also identified here. These represented 21.8 % of cases, in addition to the 15 who were admitted. In terms of the total number of gastroenteritis cases this would mean an estimated 74 additional cases per week.

One case which was admitted was identified as not needing admission in terms of the criteria (taking this into account, the estimated increase in admissions referred to above would be 72 cases per week.

In the **Protein Energy Malnutrition** group of patients 24.2 % of cases were admitted (8). A further 39.4 % (13) were found to require admission according to the criteria (an overall additional 40 cases per week).

Conclusion: The criteria for admission are set so that only very ill patients are admitted. Despite this, it would appear that a significant number of patients are not being admitted who actually require admission. The PRU (and outpatient benches) seems to be functioning as a hospital ward, but without the benefit of ward facilities.

2. SPECIFIC CRITERIA

2.1. Criteria relating to Investigation:

The majority of the Pneumonia and Gastroenteritis cases complied with the accepted standards. However, in the Gastroenteritis cases, the monitoring of the electrolytes prior to admission was responsible for most of non-compliance (18.0 %; 13 of 70 cases). This is an important factor because the objective of the PRU is to provide fluid and metabolic resuscitation services for patients before admission or discharge. It is appears that adequate monitoring is not being provided: metabolic complications was one of the major reasons for admission to the wards.

The majority of investigation requirements for the Protein Energy Malnutrition group were not met (57.4 %; 62 of 108 records). The interpretation of this is more difficult than for Gastroenteritis, since there is some overlap - the admission procedures relating to electrolytes in particular. However, there is an apparent failure to monitor for stool parasites and haemoglobin in many outpatients where applicable, according to the criteria used.

2.2. Criteria relating to Immunization.

Certain knowledge of the immunization status of patients was only known for about 40 % of cases for each condition. It is noted that immunization may well have been given in the 'non-complying' groups or it may not have been indicated (many cases were classified as post-measles), but no written record was made in the outpatients notes. Two Profession Nurses have the responsibility for checking the immunization status of patients in the department. The patients are encouraged to bring their "Road to Health' cards (RTH) with them to the outpatient department: if the child is considered as being susceptible to measles infection, then the appropriate immunization is given (vaccine if over 8 months of age, hyperimmunoglobulin in the 4 to 8 month old or severe kwashiorkor patient over 8 months). Apparently this is recorded on the Road To Health card and, in the case of

the immunoglobulin, on the record chart as well. This, however, is not always done and many do not bring in their RTH cards. This service is not, however, provided at night and weekends are not catered for.

Measles immunization in the hospital setting is particularly important; hospital acquired infection is usually more virulent and particularly so when the child's immune status is already compromised. This survey has not been able to arrive at a good estimate of the immunization coverage within the hospital. (See discussion below - Immunization Inpatients).

2.3. Criteria relating to Antibiotic Usage.

Non-compliance was recorded in 34.3 % of Gastroenteritis cases, mainly relating to unnecessary use of antibiotics (71.8 %) , according to the criteria. The majority of the remainder (26.1 %) were in respect of the investigation requirements prior to antibiotic use. This also applied to 8 of the Protein Energy Malnutrition cases (38.1 %) which did not comply with the criteria.

Much of the above is due to the precautionary administration of antibiotics prior to discharge home. Nonetheless, it is a measure, according to the criteria, of inappropriate use of antibiotics.

2.4. Criteria relating to Rehydration: Doctors' Orders.

The crucial place of the management of fluids and electrolyte balance in children is again emphasized. Only 9 records of the entire sample contained any record of these orders ! The procedures, types and quantities of fluids are usually written on sheets or charts which do not form a permanent part of the record. There is therefore no way to check retrospectively on this vital aspect of prescription - while it may not be possible to keep every item relating to a patient, the doctors orders should be given a high priority, if recorded in the correct place. The fact that this data is missing would be very difficult to defend in any litigation suite. When viewed in conjunction with the main reasons for admission, there is reason to believe that a close scrutiny of actual fluid prescriptions would be beneficial.

Analysis of the assessment of the dehydrated patient by the doctor was again difficult in many cases because of missing information. Of the applicable cases, 47.1 %, 23.13 % and 26.7 % for Pneumonia, Gastroenteritis and Protein Energy Malnutrition respectively could not be assessed. The majority of these cases were in the PRU: it was found that only 8 of the 103 Gastroenteritis cases and 3 of the 15 Protein Energy Malnutrition cases were not adequately reviewed. Although a small number, it does represent a **minimum** amount, with a large number who could not be assessed (150) - this unit is intended to function as a high care area. The non-compliance was in respect of cases seen in the evenings who were not reassessed until the morning.

2.5. The vast majority of the Other Factors of the Treatment Process (oxygen therapy for pneumonia, resuscitation measures in malnutrition) were not assessable because of lack of data. This also applied to the important aspect of nurse monitoring. The criteria used here related to the very minimum of duties which the nurse is required too undertake - the records are not kept. In the Gastroenteritis sample where the records were available, however, compliance was not complete (9.9 %: 14 cases). Many of these records contained prescribing and other information or directions given by the doctor which was not recorded elsewhere. This is an area which warrants further investigation.

It is important to note that these comments probably relate to many if not all disciplines.

3. CRITERIA RELATING TO FITNESS FOR DISCHARGE.

Fitness for discharge from POPD care was assessed for Gastroenteritis under 2 criteria - first relating to clinical findings and second to electrolyte status. The majority fulfilled the clinical criteria, but electrolyte assessment was not possible in 51.2 % (22) of the 43 discharged cases. A second important finding was that 13 (30.2 %) cases did not comply with the monitoring of electrolyte criteria. These were cases where electrolytes were found to be significantly abnormal (majority potassium levels which had required therapy) and no timeous subsequent monitoring was undertaken prior to discharge.

The comments under 2.1 are also applicable here.

In terms of the OVERALL assessment two main factors are again highlighted. Firstly, the large number of records where basic information is lacking (Pneumonia 52.1 %, Gastroenteritis 42.6 %, Protein /energy Malnutrition 40.2 %); these findings are likely to be universal in the hospital setting, applicable to many records in many disciplines. This is cause for concern. Litigation may well become a part of everyday life here as elsewhere, but, more importantly, peer review and other forms of evaluation will and must be established to maintain standards of care. This is particularly important in view of the increasing prominence of cost containment measures and privatization (the profit factor).

Secondly, the rates of non-compliance (a MINIMUM subset of information); this will be expanded on following discussion of the inpatient results.

Survey of Selected Conditions - Inpatients (Objective 2 (d)).

Purpose :

To match aspects of the process of care on the wards of the Paediatric Department with pre -determined standards of practice.

Definitions :

Detailed under Objective 2 (c).

Method :

The methods for determining the conditions to be studied were as detailed under Objective 2(c).

A retrospective sample of patient records was reviewed. The departments computer was used to select the sample. All the patients admitted to the wards with the relevant conditions during the first seven days of January and April 1986 were included in the sample.

The Neonatal unit was included in this part of the survey. The sample included all patients weighing < 2 500 gms AND < 28 days old (Low Weight) and was chosen because of the specialized care required in this group of patients.

The records of the sample selected were then drawn by the researcher and the records matched against the established criteria (Appendices 9 to 12). The results were entered onto collation sheets for analysis.

Limitations of the Study:

1. Time limitations required a reduction in the sample size, but this is considered sufficient to give a representative sample of the conditions for this study.

2. The problems mentioned in respect of the arriving at the criteria used in the outpatient survey also apply here, namely, little experience with the method and the need for the results to fulfil several functions.

Results :

DEFINITIONS

Three conditions were chosen for review in the general wards: firstly, Protein Energy Malnutrition (P.E.M.) - weight of less than the 3 rd centile for age and frank kwashiorkor where this weight criteria may be inappropriate; secondly, all forms of Pneumonia; and thirdly, Gastroenteritis. Apart from the exception discussed in the next paragraph, the diagnoses AS CODED IN THE DEPARTMENT were used, as these are all assessed by consultants prior to coding.

Patients who fulfilled the definition of 'Protein Energy Malnutrition' according to weight, and not formally diagnosed as such, were also included in the study sample.

The results tabulated here are a summary, grouped according to the criteria categories; the conditions, if applicable, are dealt with under each heading. Sample: Tables 54 and 55 indicate the total admissions for January and April 1986, of which all the patients with the selected conditions for the first 7 days of each month were selected. The total admissions for these 2 months was 2472 patients and the sample assessed was 391; this represents 15.8 % of **ALL** admissions for these 2 months, or 32 % of the average monthly admissions.

TABLE 54 WARD ADMISSIONS - 1986 (JANUARY AND APRIL)

SELECTED CONDITIONS - INPATIENTS

	WARDS	NEONATAL	Total
JANUARY	606	506	1112
APRIL	628	732	1360
Total	1234	1238	2472

Total Admissions: 2472 Monthly Average: 1236

TABLE 55 SELECTED CONDITIONS - SAMPLE SIZE

SELECTED CONDITIONS - INPATIENTS

CONDITION	Number
Pneumonia	95
P.E.Malnutrition	114
Gastroenteritis	99
Low Weight	83
Total	391

(A further 7 records [3 general, 4 neonatal] could not be assessed - 4 folders could not be found, 3 no admission notes found in folder.)

1. ADMISSIONS

(Table 56)

1.1. Pneumonia. 83 of the 95 cases included in the study (87.4 %) complied with the criteria. The admissions were associated with other complications in 73.7 % of cases (70) - mainly malnutrition, laryngotracheobronchitis and gastroenteritis. 10 cases (10.5 %) could not be assessed; this was because, in the absence of other factors, it was necessary to evaluate the admission according to the respiratory rate on admission. However, in only 9 cases overall (9.5 %) was the respiratory rate recorded. 2 (2.1 %) were admitted who did not comply with the criteria for admission.

1.2. Gastroenteritis. 97 of the 99 cases (98.0 %) complied with the criteria, while the remaining 2 did not. Admissions were associated in the majority of cases with metabolic abnormalities (38.1%), malnutrition (22.1 %), associated with other diseases (14.1 %) and gastroenteritis recurring within one month of a previous admission (9.7).

TABLE 56 ADMISSION CRITERIA

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	83	(87.4)	10	(10.5)	2	(2.1)	95	(100)
G.ENTERITIS	97	(98.0)	0		2	(2.0)	99	(100)
P.E. MAL	113	(99.1)	1	(0.9)	0		12	(100)
LOW WEIGHT	79	(95.2)	0		4	(4.8)	83	(100)

1.3. Protein Energy Malnutrition. 113 of the 114 cases (99.1 %) complied with the criteria. 36.2 % of admissions were associated with gastroenteritis, 32.9 % with other overt infections and 22.1 % with none of these conditions.

1.4. Low Weight. 79 of the 83 cases included (95.2 %) complied with the criteria for admission. 27.1 % did not have specific complications, 20.7 % were below 1.5 Kg weight, 14.4 % suffered from the respiratory distress syndrome and 13.5 % from hypoglycaemia.

4 cases (4.8 %) did not comply with the criteria.

2. INVESTIGATIONS
(Table 57)

2.1. Pneumonia. Of the 373 items assessed, 305 (81.8 %) complied with the criteria, 15 (4.0 %) could not be assessed because of lack of data, and 53 (14.2 %) did not comply. These latter were consisted mainly of the requirements for taking blood and other cultures when infections were suspected, the use of Mantoux skin tests, and the taking of chest radiographs.

2.2. GASTROENTERITIS. 221 of the 372 items assessed (59.4 %) complied with the criteria, while 71 (19.1%) were unable to be assessed. 80 (21.5 %) did not comply: the major criteria responsible for this were the culturing of stool samples,electrolyte monitoring and the use of Mantoux skin testing.

2.3. Protein Energy Malnutrition. Of the 937 items included here 516 (55.1 %) complied with the criteria. 114 (12.1 %) could not be assessed: the major category responsible for this were the lack of information regarding the monitoring of blood glucose and the Mantoux skin test. 307 (32.8 %) did not comply with the criteria: the major criteria responsible for this were failure to investigate prothrombin and serum protein levels, and send samples for stool parasite examination.

2.4. Low Weight. 150 of the 272 items in this section (55.1 %) complied with the criteria, while only 7 (2.6 %) could not be assessed. 115 (42.3 %) did not comply. This was accounted for by the failure to take haemoglobin and/or bilirubin measurements on admission (or weekly in some cases).

TABLE 57 INVESTIGATIONS CRITERIA

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	305	(81.8)	15	(4.0)	53	(14.2)	372	(100)
G.ENTERITIS	150	(55.1)	7	(2.6)	115	(42.3)	272	(100)
P.E. MAL	516	(55.1)	114	(12.1)	307	(32.8)	937	(100)
LOW WEIGHT	221	(59.4)	71	(19.1)	80	(21.5)	372	(100)

3. IMMUNIZATION

3.1. Wards: This was difficult to assess since no record in 80 % of all the conditions no record of immunization status was found. Immunization may not have been indicated or the child may have been immunized in the outpatients department prior to admission, but there was no record of this in the notes. (Table 58)

3.2. Neonatal Unit 29 of the 83 records (35.4 %) indicated compliance with BCG admission - the other 64.6 % had no record. There was no indication in the records of either poliomyelitis or hepatitis immunizations. (Table 59)

TABLE 58 IMMUNIZATION CRITERIA - WARD CONDITIONS

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	11	(20.7)	42	(79.3)	53	(100)
P.E. MAL	15	(19.5)	62	(80.5)	77	(100)
G. ENTERITIS	9	(15.8)	48	(84.2)	57	(100)

TABLE 59 IMMUNIZATION CRITERIA - BCG - NEONATAL UNIT

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)
BCG	29	(35.4)	53	(64.6)	82	(100)

4. ANTIBIOTIC CRITERIA
(Table 60)

4.1. Pneumonia. 95.8 % of cases (91 of 95) complied with the criteria. The majority of these patients were given more than a single drug. In those cases requiring drug changes (22) following sensitivity testing, 91.0 % (20) complied with the criteria.

4.2. Gastroenteritis. 78 of the 98 cases included (79.6 %) complied with the criteria. 7 (7.1 %) could not be assessed because of lack of information. 13 (13.3 %) did not comply with the criteria: these cases involved the use of antibiotics inappropriately or without the necessary investigations prior to institution of therapy.

4.3. Protein Energy Malnutrition. 90 of the 102 cases complied with the criteria (88.2 %). 8 cases did not comply (7.9 %), no investigations being undertaken prior to the institution of therapy.

4.4. Low Weight. (Table 60) 12 of the 29 records included in this section (41.4 %) complied with the criteria, while an equal number did not. This was mainly in respect of lack of appropriate investigations, and relates especially to testing for syphilis and spinal fluid examination.

TABLE 60 ANTIBIOTIC CRITERIA

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	91	(95.8)	1	(1.1)	3	(3.1)	95	(100)
G. ENTERITIS	78	(79.6)	7	(7.1)	13	(13.3)	98	(100)
P.E. MAL	90	(88.2)	4	(3.9)	8	(7.9)	102	(100)
LOW WEIGHT	12	(41.4)	5	(17.2)	12	(41.4)	29	(100)

5. BLOOD GASES CRITERIA - PNEUMONIA

Only 2 of the 16 applicable cases (12.5 %) complied with the criteria for blood gas monitoring and the following response. 11 cases did not comply (68.7 %) - these were mainly failure to conduct blood gas measurements where required by the criteria. (Table 61)

TABLE 61 BLOOD GAS CRITERIA - PNEUMONIA

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
2	(12.5)	3	(18.8)	11	(68.7)	16	(100)

6. RESUSCITATION PROCEDURES - PROTEIN ENERGY MALNUTRITION

The vast majority of cases (73 of 95) could not be assessed (76.8 %) because of no record of measurement of blood glucose or haemoglobin on admission. Where investigations were well documented, 4 cases were found to comply (4.2 %) and 18 (19.2 %) did not comply with the criteria (Table 62).

TABLE 62 RESUSCITATION PROCEDURES - PROTEIN ENERGY MALNUTRITION

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
4	(4.2)	73	(76.8)	18	(19.2)	95	(100)

7. METABOLIC MANAGEMENT - GASTROENTERITIS

93 of the 156 items assessed here complied with the criteria (59.6 %), while 15 (9.6 %) could not be assessed because of lack of information (orders in notes, treatment cards). 48 (30.8 %) did not comply - this was mainly due to the failure to meet the criteria of response to hypokalaemia and / or high base deficit (Table 63).

TABLE 63 METABOLIC MANAGEMENT - GASTROENTERITIS

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
		No	(Perc)	No.	(Perc)	No.	(Perc)
93	(59.6)	15	(9.6)	48	(30.8)	156	(100)

8. NEED FOR AND TYPE OF INTRAVENOUS INFUSION

Of the 75 items assessed, 63 (84.0 %) complied with the criteria, while 6 (8.0 %) did not comply and a further 6 could not be assessed (Table 64).

TABLE 64 NEED FOR AND TYPE OF INTRAVENOUS INFUSION - LOW BIRTH WEIGHT

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
63	(84.0)	6	(8.0)	6	(8.0)	75	(100)

9. SKIN THERAPY - PROTEIN ENERGY MALNUTRITION

14 of the 20 applicable records complied with the criteria (70.0 %). the remaining 6 (30.0 %) could not be assessed, because of lack of documentation (Table 65).

TABLE 65 SKIN THERAPY - PROTEIN ENERGY MALNUTRITION

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
14	(70.0)	6	(30.0)	0		20	(100)

10. RESPONSE TO POSITIVE SYPHILIS SERUM TEST - LOW WEIGHT

Of the 83 cases, the serum test was negative in 42 (54.2 %). Of the remaining 41, 38 had no record of the mothers serum test (45.8 % of the total cases) and could therefore not be assessed against the criteria (Table 66). 2 positive cases did not under lumbar puncture testing.

TABLE 66 RESPONSE TO POSITIVE SYPHILIS TEST - LOW BIRTH WEIGHT

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
1	(2.4)	38	(92.7)	2	(4.9)	41	(100)

11. FLUID MANAGEMENT OF CASES

11.1. Doctors Orders

The majority of ward conditions could not be assessed regarding fluid therapy, because of lack of written documentation (Table 67) - 68.8 % (55 cases) for Pneumonia, 52.3 % (48 cases) for Protein Energy Malnutrition, and 45.9 % (45 cases) for Gastroenteritis. The number of Pneumonia cases which did not comply with the criteria was 9 (11.2 %); the figures for Protein energy Malnutrition and Gastroenteritis cases were 10 (11.1 %) and 10 (10.2 %) respectively. These latter figures mainly related to the moderately dehydrated, where insufficient quantities of fluids were ordered, and to the failure to institute intravenous fluid therapy in some cases where it was warranted it.

The statistics for the Low Weight assessments are also indicated in Table 67. Sixty seven (67) of the 81 relevant cases (82.7 %) complied with the criteria. The remaining 14 cases (17.3 %) could not be assessed because of lack of documentation.

TABLE 67 TREATMENT FLUIDS - ORDERS

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	16	(20.0)	55	(68.8)	9	(11.2)	80	(100)
P. E. MAL	32	(35.6)	48	(53.3)	10	(11.1)	90	(100)
G.ENTERITIS	43	(43.9)	45	(45.9)	10	(10.2)	98	(100)
LOW WEIGHT	67	(82.7)	14	(17.3)	0		81	(100)

11.2. Doctors Assessment Dehydrated / Cases on Intravenous Fluids

The majority of items based in this section were found not to comply with the criteria (Table 68). Few patients notes had any record of being reviewed as frequently as required as far as fluid therapy was concerned. In the case of Pneumonia, 70.0 % (21 of 30 cases requiring monitoring) did not comply with the criteria while 6.7 % (2) did. Protein Energy Malnutrition similarly had a non-compliance finding of 77.3 % (34 of 44 cases requiring monitoring) and 2 (4.5 %) complying. 79.6 % (43) of the 54 Gastroenteritis cases requiring monitoring were found not to comply with the criteria and only 9.3 % (5) which did.

TABLE 68 TREATMENT FLUIDS - ASSESSMENT

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	2	(6.7)	7	(23.3)	21	(70.0)	30	(100)
P. E. MAL	2	(4.5)	8	(18.2)	34	(77.3)	44	(100)
G.ENTERITIS	5	(9.3)	6	(11.1)	43	(79.6)	54	(100)
LOW WEIGHT	11	(78.6)	2	(14.3)	1	(7.1)	14	(100)

12. NURSE MONITORING

The nursing records were not available for the majority of cases in each of the conditions reviewed (Table 69). 71.0 % of the 93 Pneumonia cases (66), 83.3 % of the 95 Protein Energy Malnutrition cases, 92.9 % of the 99 Gastroenteritis cases, and 72.1 % of the 161 Low Weight items (116) could not be assessed because of lack of documentation.

TABLE 69 NURSE MONITORING

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	26	(27.9)	66	(71.0)	1	(1.1)	93	(100)
P. E. MAL	18	(15.8)	95	(83.3)	1	(0.9)	114	(100)
G.ENTERITIS	5	(5.1)	92	(92.9)	2	(2.0)	99	(100)
LOW WEIGHT	43	(26.7)	116	(72.1)	2	(1.2)	161	(100)

13. REACTION TO COMPLICATIONS - PNEUMONIA

16 cases could not be assessed as there was no record of the pulse in the records (Table 70). 6 other cases had complications - 3 were pulse rates above 160 beats per minute, which were not treated according to the criteria and three complied with these criteria (empyema, pneumothorax, digitalization).

TABLE 70 REACTION TO COMPLICATIONS - PNEUMONIA

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
3	(13.6)	16	(72.8)	3	(13.6)	22	

14. NUTRITIONAL REQUIREMENTS - PROTEIN ENERGY MALNUTRITION

56 (53.8 %) of the 104 applicable cases made no reference to special nutritional arrangements and / or vitamin supplementation. 21 (20.2 %) of the remaining cases could not be assessed (Table 71).

TABLE 71 FEEDING CRITERIA - PROTEIN ENERGY MALNUTRITION

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
27	(26.0)	21	(20.2)	56	(53.8)	201	

15. RESPIRATORY DISTRESS SYNDROME - LOW WEIGHT

Of the 44 items assessed, 33 (75.0 %) complied with the criteria, while 1 (2.3 %) could not be assessed. A further 10 (22.7%) did not comply: this was accounted for mainly by the non-compliance with appropriate blood gas measurements or responses (Table 72).

TABLE 72 RESPIRATORY DISTRESS SYNDROME - LOW WEIGHT

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
33	(75.0)	1	(2.3)	10	(22.7)	44	

16. INITIAL PHOTOTHERAPY - Low Weight

Of the 26 cases in this section, 23 (88.5 %) complied with the requirement of phototherapy. 2 cases did not comply (7.7 %) (Table 73).

TABLE 73 INITIAL PHOTOTHERAPY - LOW WEIGHT

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
23	(28.5)	1	(3.8)	2	(7.7)	26	

17. JAUNDICE - LOW WEIGHT

105 items were included in this section: 86 (81.9 %) complied with the criteria, while 17 (16.2 %) did not (Table 74). This latter figure was mainly as a result of none compliance with all the immediate investigations required by the criteria.

TABLE 74 JAUNDICE CRITERIA - LOW BIRTH WEIGHT

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
86	(81.9)	2	(1.9)	17	(16.2)	105	

18. TRANSFER TO CLAIRWOOD HOSPITAL - PNEUMONIA

27 of the 30 cases (90.0 %) complied with the criteria, while 2 were found not to have complied (6.7 %) (Table 75).

TABLE 75 TRANSFER TO CLAIRWOOD HOSPITAL - PNEUMONIA

SELECTED CONDITIONS - INPATIENTS

COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
27	(90.0)	1	(3.3)	2	(6.7)	30	

19. FIT FOR DISCHARGE

19.1. Clinical

(Table 76)

Pneumonia: Of the 79 items considered, 73 were in compliance with the criteria (92.4 %), while 3 (3.8 %) could not be assessed. A further 3 (3.8 %) did not comply - discharged before ready according to the criteria.

Protein Energy Malnutrition: Of the 227 items considered, 178 were incompliance with the criteria (78.4 %). 23 (10.1 %) did not comply, mainly because the patients involved did not have a sustained weight gain prior to discharge. 26 (11.5 %) could not be assessed.

Gastroenteritis: 75 items were considered here, with 70 complying with the criteria (93.3 %).

Low Weight: Of the 148 items considered, 120 (81.1 %) complied with the criteria. 20 (13.5 %) did not, mostly due to discharge prior to the accepted weight being reached.

TABLE 76 DISCHARGE HOME (CLINICAL)

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	73	(92.4)	3	(3.8)	3	(3.8)	79	(100)
P. E. MAL	178	(78.4)	26	(11.5)	23	(10.1)	227	(100)
G. ENTERITIS	70	(93.3)	5	(6.7)	0		75	(100)
LOW WEIGHT	120	(81.1)	8	(5.4)	20	(13.5)	148	(100)

19.2. Metabolic
(Table 77)

Gastroenteritis: Of the 66 cases assessed in this regard, 39 (59.1 %) could not be assessed, as results (if in fact any were ordered) were not available nor remarked on. 26 (39.4 %) complied with the criteria.

Low Weight: 13 of the 20 cases included here (65.0 %) could not be assessed because of no documentation regarding electrolyte monitoring prior to discharge. 6 (30.0 %) complied with the criteria.

TABLE 77 DISCHARGE CRITERIA - METABOLIC

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
G. ENTERITIS	26	(39.4)	39	(59.1)	1	(1.5)	66	(100)
LOW WEIGHT	6	(30.0)	13	(65.0)	1	(5.0)	20	(100)

19.3. Haematological

86 of the Low Weight cases were included for these criteria; 33 (38.4 %) complied, but 51 (59.3 %) could not be assessed (Table 78).

TABLE 78 DISCHARGE CRITERIA - HAEMATOLOGICAL

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
LOW WEIGHT	33	(38.4)	51	(59.3)	2	(2.3)	86	(100)

20. DISCHARGE / FOLLOW UP PREPARATION.

(Table 79)

Pneumonia: Of the 80 relevant cases, 34 (42.5 %) complied with the criteria, while 46 (57.5 %) were notable to be assessed.

Protein Energy Malnutrition: Of the 81 relevant cases, 18 (22.2 %) complied with the criteria. 62 (76.6 %) could not be assessed.

Gastroenteritis: 75 cases were included, of which 19 (25.3 %) complied with the criteria and 55 (73.3 %) could not be assessed.

Low Weight: Of the 64 relevant cases, 15 (23.4 %) complied with the criteria, while 49 (76.6 %) could not be assessed.

TABLE 79 DISCHARGE PREPARATION / FOLLOW UP CRITERIA

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	34	(42.5)	46	(57.5)	0		80	(100)
P.E. MAL	18	(22.2)	62	(76.6)	1	(1.2)	81	(100)
G. ENTERITIS	19	(25.3)	55	(73.3)	1	(1.1)	75	(100)
LOW WEIGHT	15	(23.4)	49	(76.6)	0		64	(100)

21. SUMMARY OF WHOLE ASSESSMENT

The overall assessment figures for the four groups of study data are shown in Table 80.

798 items / groups were assessed in the 95 Pneumonia cases. 430 (53.9 %) did complied with the criteria, while 109 (13.6 %) did not. A further 259 (32.5 %) could not be assessed because of lack of documentation.

1032 items / groups were assessed for the 114 cases of Protein Energy Malnutrition. 436 (42.2 %) complied with the criteria, while 207 (20.1 %) did not. A further 389 (37.7 %) could not be assessed.

781 items / groups were assessed for the 99 Gastroenteritis cases. 366 (46.9 %) complied with the criteria, while 118 (15.1 %) did not comply. A further 297 (38.0 %) could not be assessed.

702 items / groups were assessed for the 83 Low Weight cases. 362 (51.6 %) of these complied with the criteria, while 86 (12.2 %) did not. A further 254 (36.2 %) could not be assessed.

TABLE 80 OVERALL ASSESSMENT FIGURES

SELECTED CONDITIONS - INPATIENTS

	COMPLIED		UNABLE TO ASSESS		DID NOT COMPLY		Total	
	No.	(Perc)	No.	(Perc)	No.	(Perc)	No.	(Perc)
PNEUMONIA	430	(53.9)	259	(32.5)	109	(13.6)	798	(100)
P.E. MAL	436	(42.2)	389	(37.7)	207	(20.1)	1032	(100)
G. ENTERITIS	366	(46.9)	297	(38.0)	118	(15.1)	781	(100)
LOW WEIGHT	362	(51.6)	254	(36.2)	86	(12.2)	702	(100)

22. DEATHS RECORDED DURING THE STUDY PERIOD.

Table 81 indicates the number of deaths recorded during the study period (First seven days of January and April 1986. It must again be noted that these figures cannot be summated to arrive at an overall statement of rates as many conditions occurred together - see Objective 2 (b).

14 of the 95 cases with the diagnosis of Pneumonia died (14.7 %).

28 of the 114 cases with Protein Energy Malnutrition died (24.6 %).

24 of the 99 cases with Gastroenteritis died (24.2 %).

9 of the 83 cases in the Low Weight group died (10.8 %).

TABLE 81 DEATHS

SELECTED CONDITIONS - INPATIENTS

	DEATHS	(PERC)	TOTAL
PNEUMONIA	14	(14.7)	95
P.E. MAL	28	(24.6)	114
GASTROENTERITIS	24	(24.2)	99
LOW WEIGHT	9	(10.8)	83

Discussion : Selected Conditions - Inpatients

The reason for measuring aspects of the process of care against accepted standards of practice is to objectively assess the quality of care provided. In terms of the inpatients study of selected conditions, the discussion is directed to answer the following questions:-

1) Should the cases have been admitted ?

2) Are specific goals relating to certain investigations, procedures and aspects of therapy being met ?

3) Are specific goals being met prior to discharge from hospital ? Specifically, were patients being discharged who should not have been discharged ?

The four conditions selected for study were Gastroenteritis, Pneumonia, Protein Energy Malnutrition and Low Weight infants (as defined). These conditions represent the major categories of admission to the wards. It must again be emphasized that the number of cases which complied or did not comply with the criteria represent a MINIMUM number (if information were available for the groups which could not be assessed, these groups would not decrease; this is therefore a measure of the **minimum compliance or non-compliance.** The results for the individual conditions cannot be summated, however, because the conditions are often present in the same patient.

1. CRITERIA RELATING TO ADMISSION.

There was a uniformly high percentage of compliance with admission criteria, with only 2 % of cases for both Pneumonia (2) and Gastroenteritis (2) which could be considered not to have complied with the criteria for needing admission. This is in keeping with the outpatient findings. The slightly higher percentage of 4.8 % (4) for the Low Weight group is also low when considering the cases specifically (admitted from the labour ward late at night and discharged well in the morning).

10 Pneumonia cases could not be assessed because, in the absence of other factors, the respiratory rate was not recorded. The findings are therefore similar to the outpatients in this regard. Only 9 of the 95 cases (9.5 %) had even a single recording of respiratory rate: the majority of these were

contained in routine nursing records. This means that a potentially valuable, objective clinical finding is not available for assessment, if indeed it has been measured.

The major reasons for admission (1986) correlate with the findings in the outpatients study (1987) (namely, Pneumonia - complications of malnutrition, laryngotracheobronchitis and gastroenteritis in the main; Gastroenteritis - metabolic abnormalities, malnutrition, and other infectious diseases; Protein Energy Malnutrition - gastroenteritis and other overt infection). In the Low Weight group, apart from admission directly because of this low weight, the major groups were very low weight (<1.5 Kg), respiratory distress syndrome and hypoglycaemia. This pattern is the same as in other hospitals dealing with similar populations.

2. CRITERIA OF MANAGEMENT

2.1. Criteria relating to Investigations.

14.2 % of the pneumonia cases, 21.5 % of the gastroenteritis cases and 32.8 % of the protein energy malnutrition cases did not comply with the criteria. If ANY reference indicated that an investigation may have been asked for, this was taken as complying ! This is a very wide net - the high none compliance further illustrates the fact that any action based on the records would be difficult to defend. Doctors in the teaching hospital environment are frequently accused of the indiscriminate use of investigations, but it would appear that more attention is required to see if appropriate minimum investigations are actually being undertaken.

2.2. Criteria relating to Immunization.

It has been shown that the outpatient records are lacking in data regarding the immunization status of attenders: this is also the case for the inpatient record. 80 percent of cases in each of the selected conditions were not able to be assessed. Considering the factors mentioned with regard to the immunization in the outpatients department, it is likely that a number of patients are not receiving vaccine / hyperimmunoglobulin as required. Furthermore, patients admitted without their Road To Health cards will probably have no record of immunization even if it were given in hospital. This area needs to be fully reviewed. The ordering of immunoglobulin should in theory be prescribed by the medical officer; the RECORD does not reflect the amount of immunoglobulin actually used.

BCG administration is routine at King Edward VIII, but the record contains little confirmation of this fact. Tuberculosis remains a major scourge in our society and attention will again need to be drawn to this aspect of control.

2.3. Criteria relating to Antibiotic Use.

The majority of the records assessed complied with the criteria. In the Gastroenteritis and Low Weight cases, which had the highest non-compliance rates (13.3 %, 41.4 % respectively), the main factors were initiation of therapy without the appropriate investigations being undertaken. (The criteria in this regard were very specific, especially in the case of Low Weight.

Inappropriate use of antibiotics is also a small factor in Gastroenteritis, Protein energy Malnutrition and Low Weight cases.

2.4. Criteria relating to Specific Factors and Conditions.

2.4.1. BLOOD GAS MEASUREMENTS AND PNEUMONIA: This referred to the response taken to blood gas measurements and the further need to measure once any action was taken. 16 cases were included here, of which 11 (68.7 %) were found not to have complied with the requirements. 8 of these latter were due to failure to take samples where indicated; the remainder (3) were failure to take appropriate action following a result. Although clinical assessment probably took precedence, this is an aspect of care which will need to be reviewed.

2.4.2. Criteria relating to Metabolic Management of Gastroenteritis. This related to three specific areas: 1) the prescription of oral potassium, 2) response to severe hypokalaemia, and 3) response to severe acidosis. (The initial criteria regarding quantities were not applied because of lack of recorded detail.) 48 (30.8 %) of cases did not comply with the criteria (mainly with respect to hypokalaemia and acidosis. This may represent caution on the part of the doctor or, possibly, delay in reading of the results. However, when viewed as part of the overall management of fluids and electrolytes, it may be cause for concern.

2.4.3. Criteria relating to Resuscitation Procedures and Protein Energy Malnutrition. The large percentage of these records which could not be assessed were due to no record of glucose monitoring: the majority of children were over four years of age and hence this was probably not regarded as a priority. However, 18 (13.1 %) cases did not comply with the required response to the low haemoglobin level. The correction of the very low levels is not only considered to be part of the resuscitation of the patient but a part of the long term therapy as well.

2.4.4. Criteria relating to Nutritional Requirements and Protein Energy Malnutrition. Initially the intention was to assess the nutritional requirement against a planned feeding regime. The records seldom contained more than a reference to a protein and /or vitamin supplement (27; 26.0 % of applicable records). 56 (53.8 %) made no reference to one or both of the above supplements.. The major factor here was the reference to vitamins (considered not to have complied if the treatment card was available and a prescription not recorded and no reference made anywhere to the supplements). Attention is obviously given to the feeding requirements of these patients, but the record is poor.

2.4.5. Criteria relating to Positive Syphilis Serology and the Low Weight Infant. For 45.8 % of case records (38) there was no record of the mothers serology., 3 (7.3 %) cases were positive, of which 2 records did not comply (the requirement for the infant to have a lumbar puncture). The reason for this test is to exclude the need for more intensive therapy in nervous system syphilis to prevent its complications.

2.4.6. Criteria relating to Respiratory Distress and the Low Weight Infant. The strict criteria for the Respiratory Distress Syndrome and blood gas measurement was not applied in cases weighing less than 1,25 Kg. Nonetheless, in 8 of the 11 applicable cases (93.7 %) the criteria were not met (50 % of these cases did not have a sample taken when applicable and in the other 50 % appropriate action was not taken - especially in the group on oxygen alone. This may possibly reflect unavailability of ventilatory equipment at the time, although comment to this effect was not found in the notes.

2.4.7. Criteria relating to Jaundice and the Low Weight Infant. The criteria for managing jaundiced cases (including initial prophylactic phototherapy in non-jaundiced cases) were largely met. There was some non-compliance in the initial investigation of cases. No complication occurred as a result, but it is assumed that no isoimmunization reactions were in this group. The doctor may have had knowledge of the results of these investigations but no record was made.

2.4.8. Criteria relating to Intravenous Fluid Therapy and the Low Weight Infant. The specific need for intravenous therapy, apart from dehydration, was assessed with the Low Weight cases. A high degree of compliance was found (84.0 %; 63), with only 8.0 % (6) technically not complying.

2.4.9. Criteria relating to Complications and Pneumonia. 20 cases were included here (21.1 % of total cases), relating to the pulse rate. However, 16 of these were only included because there was no record of the pulse in the records. Routine monitoring of the pulse is undertaken by the nursing staff, but the majority of their records are not kept, it is vital that some record is made by the medical staff. 3 cases were not digitalized in accordance with the criteria, but the significance of this is not clear.

2.5. Criteria relating to Fluid Management of Cases:

2.5.1. Criteria relating to Fluid Management of Cases: Doctors Orders. Similar findings to the outpatient survey were found in this regard, in that the majority of records could not be assessed because of lack of documentation. It is assumed that the doctors prescribe fluids on the charts or other sheets, which do not then form a permanent part of the record. However, a minimum set was obtained for Pneumonia, Protein Energy Malnutrition and Gastroenteritis. About 10 % of cases did not comply with the standards (mainly in respect of moderately and severe cases). This is an important finding when considered along with the other factors regarding fluids and electrolytes (investigations, metabolic supplementation). There are a group of patients who are apparently not receiving optimum fluid and metabolic management.

2.5.2. Criteria relating to Fluid Management of Cases: Doctors Assessments.

The finding relating to assessment are less favourable than the outpatient findings. The high non-compliance rate may be a little misleading in that it is record based - it is assumed that when an ill patient is reviewed by the doctor, then a note will be made in the record; this may however be an adjustment to fluids on the observation sheet. Nonetheless, this is a departure from the ideal. For the ward conditions, the non-compliance was 70 % or more for the individual conditions. In the severe cases where the records complied with the criteria, assessment was undertaken as frequently as the state of dehydration warranted, but this may well have been secondary to other clinical factors.

The workload of the medical staff involved is considered to be a major factor to this lack of assessment of cases (see Objective 3). When viewed in conjunction with 2.5.1. above, it again emphasizes the seriousness of the situation with respect to the fluid and electrolyte management of dehydrated gastroenteritis cases.

3. CRITERIA RELATING TO FITNESS FOR DISCHARGE

3.1. Criteria relating to Fitness for Discharge: Clinical Factors.

It must be noted here that the measurement against the standard criteria is based on the written notes of the doctor. This documentation was, for the majority of cases, taken at face value: the whole record was considered. 'Fit for discharge' was generally taken to mean that the patient was clinically well enough to be cared for at home and to complete any necessary medication at home. This may be argued as not always being the case, but this is, after all, what has been committed to the record.

The majority of records assessed met the criteria. The Protein Energy Malnutrition and Low Weight groups, however, recorded more than 10 % non-compliance (23 of 227; 10.1 % for PEM, 20 of 148; 13.5 % for LW). The main problem here was discharge prior to satisfactory weight gain. The group of patients which comprised the highest in the 'unable to assess' category was again Protein Energy Malnutrition and the main reason here was a lack of weight measurement prior to discharge.

3.2. Criteria relating to Fitness for Discharge: Metabolic Factors. These criteria was applied to Gastroenteritis and Low Weight cases.

Gastroenteritis: applied where electrolyte abnormalities were found or suspected by the Medical Officer in the moderately to severely dehydrated. The majority of records could not be assessed - these related to cases where electrolyte abnormalities had previously been found but no record of recent monitoring could be found. Many of these would in all probability not have had their electrolyte status monitored: the value of a pre-discharge check perhaps is debateable, especially if it is not available for reading in good time. But it must be remembered that only cases where severe abnormalities existed (acidosis, hypokalaemia) were included in the assessment. This means that the electrolyte status in a previously very ill patient is probably not known in the majority of these applicable cases on discharge.

The majority of the applicable **Low Weight** group likewise were not able to be assessed in this regard (13 of 20; 65.0 %). The circumstances are, however, a little different. The cases included here were those where electrolyte abnormalities were found but the patients were not necessarily suffering from electrolyte losing conditions. It still reflects a body of patients being discharged with no knowledge of their electrolyte status in circumstances where these are potentially abnormal.

(In the Low Weight group, the haemoglobin level was not able to be assessed on discharge in 59.3 % (51) of 86 applicable cases, but were found not to comply in only 2.3 % of cases (2).)

When the clinical and metabolic factors of discharge are considered together, the general conclusion is that the vast majority of patients are being discharged when they are clinically fit for discharge, according to the criteria. The exceptions to this relate to weight gain in the PEM and LW groups. (The clinical factors are certainly very important, but the metabolic status of many previously very ill cases is not known on discharge. Factors which may be involved here include the demand on hospital beds, necessitating discharge before awaiting results or in fact before undertaking investigations. See Objective 3).

3.3. Criteria relating to follow up. The vast majority of cases had no record of any discharge preparation or follow up arrangements. Many arrangements of this nature are verbal and a follow up card is usually given to the patient. Formal bookings are not, however, made. It is an area which may need attention, especially if tracing of particular cases is considered desireable.

OUTPUT AND OUTCOME CHARACTERISTICS

(Objective 3 - also Utilization Trends and certain rates, using routine Administrative and other sources of Data)

1. Trends : Outpatients

FINDINGS:

a) King Edward VIII Hospital submits a monthly and annual Statistical Return of Patients to The Department of Hospital Services, Natal. These returns for the years 1980 and 1986 were reviewed. In 1980, 835606 outpatients attended as outpatients: in 1986 755353 visits were recorded. There is no indication of the clinics or departments attended.

b) The King Edward VIII Hospital Administration collates figures monthly for attendances. These attendances are tabulated by the Department - the nursing staff note the number of attenders and the number of these patients who are to be observed and re-examined (the 'review' cases). These figures are shown in Table 82. It is noted that the review cases are NOT recorded by the Administration for submission to the Hospital Services.

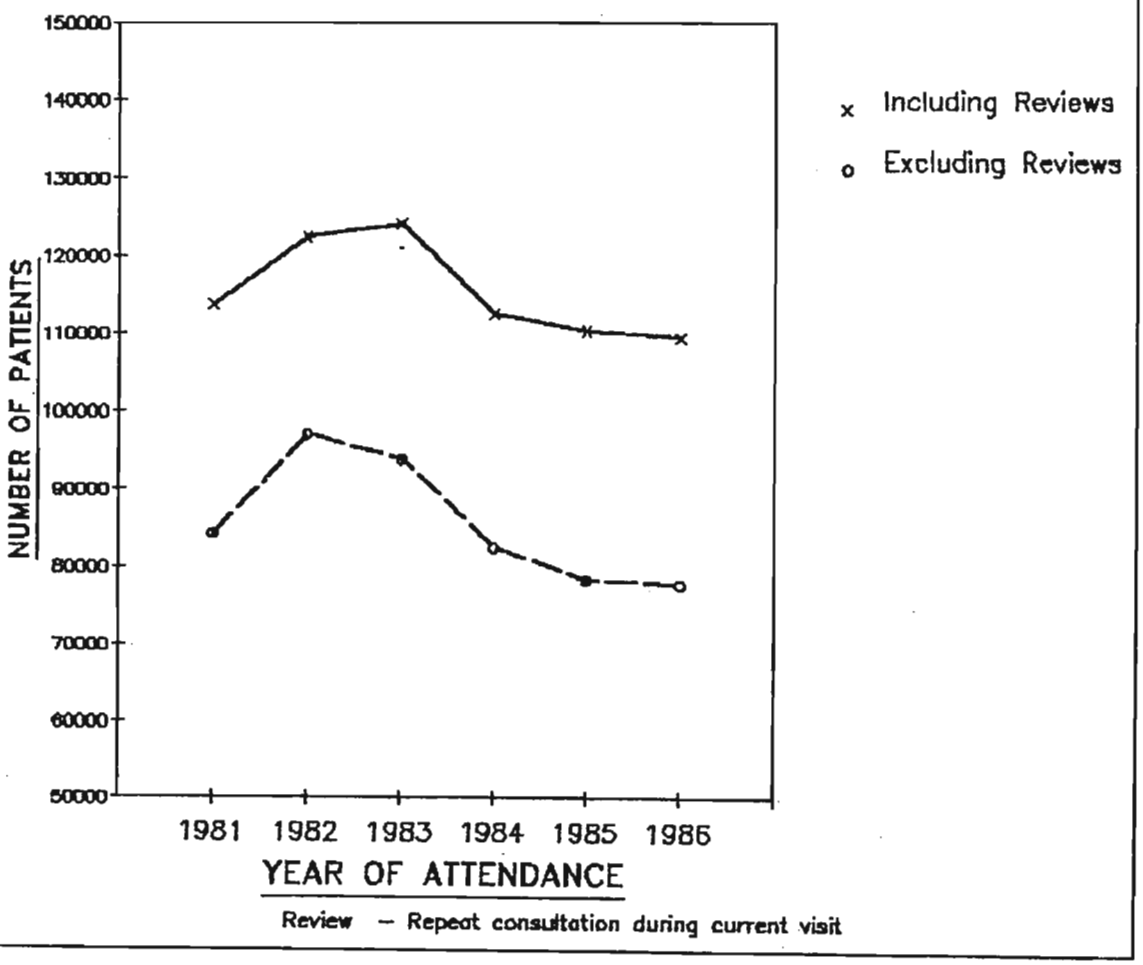
Peak attendances occurred in the year 1982 (96917), with the lowest attendances in the six year period occurring in 1986 (77701). This is part of a general downward trend, which is illustrated in Figure 2. The mean annual attendance for the six year period was 85527.

TABLE 82 ANNUAL ATTENDANCE FIGURES PAEDIATRIC OUTPATIENTS

1981 TO 1986 : Number and (Percent)

YEAR	PATIENTS	(Perc)	REVIEW	(Perc)	TOTAL	Percent
1981	84197	(16.4)	29399	(16.4)	113596	16.4
1982	96917	(18.9)	25476	(14.2)	122393	17.7
1983	93752	(18.3)	30318	(17.0)	124070	17.9
1984	82393	(16.1)	29937	(16.7)	112330	16.2
1985	78203	(15.2)	32058	(17.9)	110261	15.9
1986	77701	(15.1)	31699	(17.7)	109400	15.8
Total	513163	(100)	178887	(100)	692050	100
Percent	74.2		25.8		100	

FIGURE 2
Outpatient Annual Attendances
1981 – 1986



Review – Repeat consultation during current visit

Seasonal changes in attendances are reflected in Tables 83 and 84, and are illustrated in Figures 3 and 4 (for 1981 and 1986, respectively). Peak attendances occur between the months of January and March. There is a declining tenancy in this pattern. (Intervening years confirm this tenancy).

Review consultations are not considered in the Administration figures. There has been a steady increase in reviews over the six year period 1981 to 1986, with a yearly average of 29815 which represents 25.8 % of actual consultations (with a range of 20.6 % of all consultations in 1982 to 29.0 % 1986.

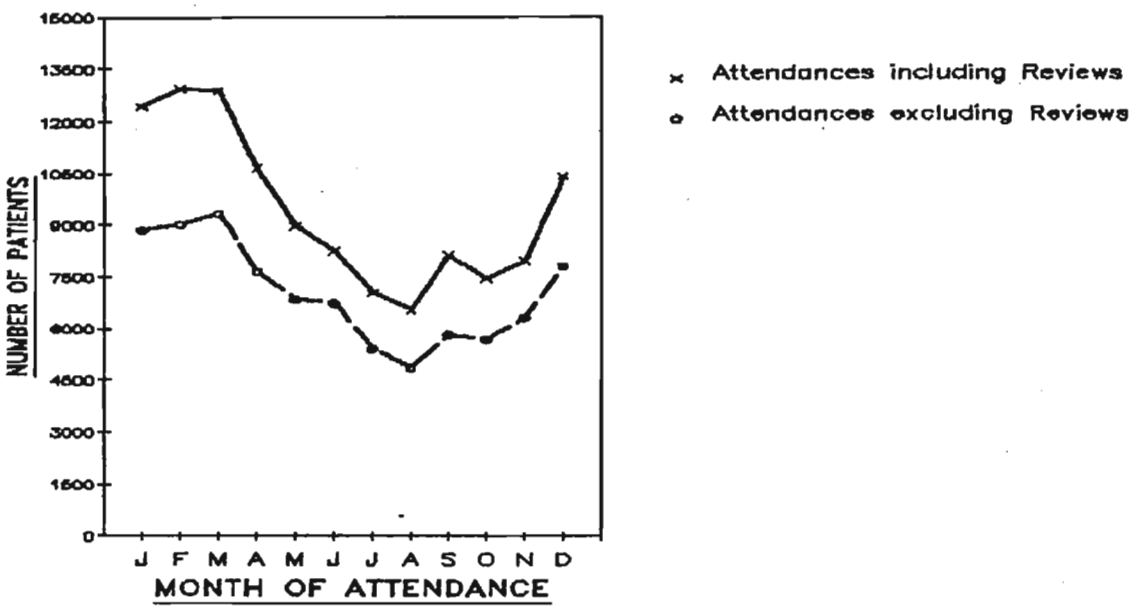
TABLE 83 MONTHLY ATTENDANCES POPD 1981

	POPD	REVIEW	TOTAL	Perc.
JAN	8848	3597	12445	28.9
FEB	9021	3907	12928	30.2
MAR	9335	3549	12884	27.5
APRIL	7635	3030	10665	28.4
MAY	6829	2138	8967	23.8
JUNE	6732	1504	8236	18.3
JULY	5393	1630	7023	23.2
AUG	4843	1692	6535	25.9
SEPT	5805	2307	8112	28.4
OCT	5667	1771	7438	23.8
NOV	6298	1659	7957	20.8
DEC	7791	2615	10406	25.1
TOTAL	84197	29399	113596	100
Perc	74.1	25.9	100	

TABLE 84 MONTHLY ATTENDANCES POPD 1986

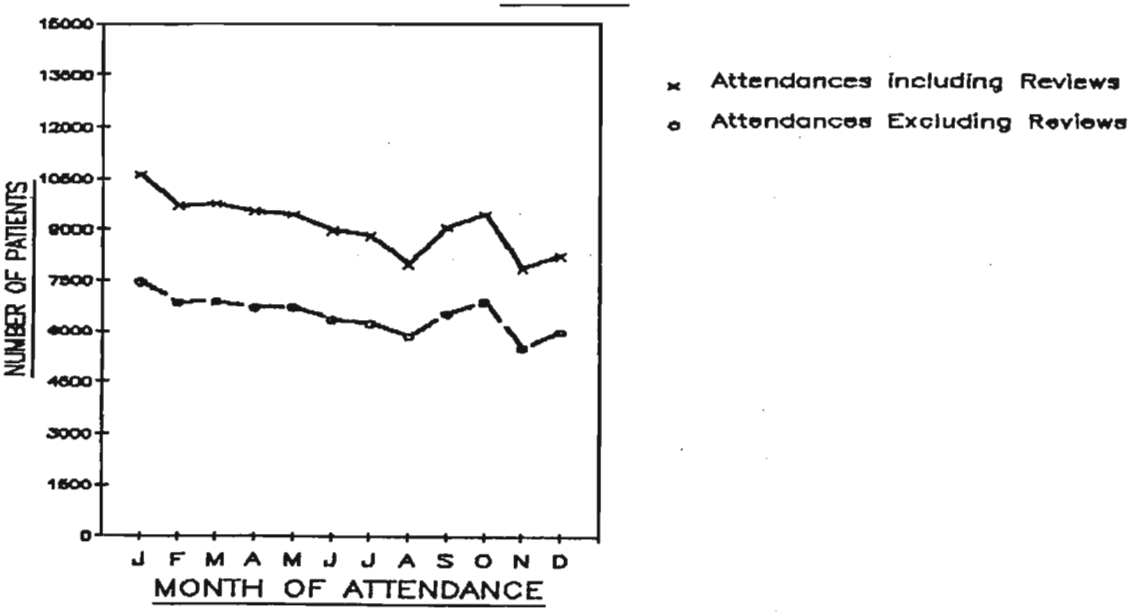
	POPD	REVIEW	TOTAL	Perc.
JAN	7448	3155	10603	29.8
FEB	6834	2872	9706	29.6
MAR	6871	2899	9770	29.7
APRIL	6697	2858	9555	29.9
MAY	6698	2760	9458	29.2
JUNE	6319	2648	8967	29.5
JULY	6204	2601	8805	29.5
AUG	5831	2138	7969	26.8
SEPT	6492	2569	9061	28.4
OCT	6852	2598	9450	27.5
NOV	5499	2348	7847	29.9
DEC	5956	2253	8209	27.4
TOTAL	77701	31699	109400	100
Perc.	71.0	29.0	100	

FIGURE 3
PAEDIATRIC OUTPATIENT ATTENDANCES
1981



Reviews — Repeat Consultation during current visit.

FIGURE 4
PAEDIATRIC OUTPATIENT ATTENDANCES
1986



Reviews — Repeat Consultation during current visit.

DISCUSSION:

There has been a steady significant decrease in outpatient attendances at King Edward VIII Hospital (80253 between 1981 and 1986, according to the annual returns. This reduction is noted to have occurred in the Paediatric Outpatient department as well (19216 between 1982 and 1986). Considering the natural increase in the population, which has been exacerbated in recent years by the steady influx of people into the urban areas, one might well expect an increased demand on services. King Edward Hospitals' facilities are but one in the region and other factors must therefore be taken into account, such as changes in peripheral services during this period and changes in access (affected by enforcement of hospital referral policy, cost of service and of getting there).

While the number of cases has decreased and the staff component has remained virtually unchanged, other factors must be considered when viewing the workload. The intention of this study was not to investigate these factors, but several indicators are apparent. The trends in the Review Consultations suggest that the workload in the department has NOT decreased. The indications are that there is a steady increase in the number of cases which need more attention than in the past, as the policy of recording these figures has not changed. 29,0 % of the consultations in 1986 were devoted to repeat consultations during the same visit to hospital. This large decrease in the number of outpatients has not lead to a similarly large decrease in admissions to the wards, which also indicates an increase in the severity of illnesses presenting. [There is also another group of outpatients which are not officially recorded; patients who are discharged from the wards are very often requested to return to the ward in one or two weeks for review. The object here is that any particular results or special examinations will readily be at hand and the patient is seen relatively quickly. Each ward sees from 1 to 7 of these patients per day.]

There are definite indications that the monthly variation in total admissions to the hospital are levelling out. A variety of factors are involved here, but one is tempted to speculate that the hospital has probably reached saturation - a maximum number of patients are being catered for. This is supported by the finding of the very high bed occupancy rates and the more severe nature of conditions treated in the department. The role of peripheral facilities in dealing with a multitude of other cases must also be an important factor to consider.

2. Trends : Inpatients

FINDINGS:

2.1. The annual Statistical Return of Patients to The Department of Hospital Services, Natal for the years 1980 and 1986 were reviewed (Table 85 refers).

2.1.1. Year 1980.

106993 ADMISSIONS were recorded in 1980, of which 27551 (25.8 %) were under the age of 12 years.

The total number of PATIENT DAYS (number of days patients spent in hospital) was 666169.

The AVERAGE LENGTH OF STAY (LOS) for all King Edward VIII patients was therefore 6.2 days (patient days / number of patients: 666169 / 106993).

The number of beds in use during 1980 were 1935.

The BED OCCUPANCY RATE, expressed as a percentage, was 94.1 % (patient days X 100 / (number of days in the year X number of beds): 666169 X 100 / (366 X 1935). [The Return incorrectly calculated this as 90,3 %.]

The total number of DEATHS was recorded as 4222, which was 3.9 % of all admissions.

2.1.2. Year 1986.

101941 ADMISSIONS were recorded in 1986, of which 28509 (28.0 %) were under the age of 12 years.

The total number of PATIENT DAYS was 672545.

The AVERAGE LENGTH OF STAY (LOS) was 6.6 days (67254 / 101941).

The number of beds in use during 1986 was 1941.

The BED OCCUPANCY RATE during 1986 was 94.9 % (672549 X 100 / {365 X 1941}).

The total number of DEATHS during 1986 was recorded as 3904 (3.8 % of total admissions).

TABLE 85 STATISTICAL RETURNS OF PATIENTS

DEPARTMENT OF HOSPITAL SERVICES

1980 AND 1986

	1980	1986
NEWBORN	16080	15849
PAEDIATRIC	10720	11970
BOARDER BABIES	751	690
OTHERS	79442	73432
TOTAL	106993	101941
PATIENT DAYS	666169	672549
AVERAGE LENGTH OF STAY (DAYS)	6.2	6.6
BEDS IN USE	1935	1941
PERCENT BED OCCUPANCY	94.1	94.9
DEATHS	4222 (3.9 %)	3904 (3.8 %)

DISCUSSION:

There has been a small decrease in the total number of patients admitted since 1980 (5052 / annum between 1980 and 1986). The under 12 year age group accounted for a slightly higher percentage of the total admissions in 1986 than in 1980.

For this total lower number of patients, however, the average length of stay has increased by 0.4 days per patient; the total patient days has in fact increased from 1980 to 1986. This would account for the slightly higher bed occupancy rate in 1986 (94.9 % as opposed to 94.1 % in 1980): for both these years, and the intervening years where this trend has persisted,the bed occupancy rate remains high, with little if any spare capacity. This is particularly marked for the Paediatric Department.

3. Administration computer data:

It is not possible to use the routine statistics available to the Administration to review the services provided by the department (See discussion on 'The limitations of available information' below). In order to try and overcome some of these inadequacies, and to calculate 'length of stay ' and bed occupancy statistics for the Paediatric Department, it is necessary to have the total number of patient days (PD) which the patients spent in hospital. But the Administration does not keep these figures for the individual wards, as noted above. One method to calculate these would be to retrospectively survey the midnight head counts which are routinely taken; time precludes this additional undertaking. It is certainly not an efficient method for management to routinely study and take decisions on this data, and has never been done.

An analysis of discharges was, therefore, undertaken using the Administration computer. The period from 1985 to 1987 (data is not kept on line for much more than two years) was reviewed. Table 86 shows the results.

It must be noted that only the admission and final discharge dates are entered onto the computer - patients are often transferred at an early stage to Clairwood Hospital, where many have long periods of stay. This period at Clairwood Hospital is also included in the patients length of stay calculation. The periods of stay at each institution are not able to be determined, since the transfer date is not recorded: the number of days admitted is entered as a single period. As far as the selected conditions

examined in Objective 2 are concerned this does not present as a problem, since the intention was to take the whole patient stay into account, including care given at Clairwood Hospital (many of the staff are rotated through these two hospitals regularly). Difficulties arise, however, in calculating the bed occupancy rates as there is not a fixed number of beds available for the King Edward VIII Hospital patients at Clairwood (who also admit a small number of patients directly to the wards from the Clairwood outpatient department). Nevertheless, an estimate was arrived for at the year 1986, after an analysis of data gathered from Clairwood Hospital (see below).

3.1. Year 1985.

LENGTH OF STAY: This was calculated as a mean of 16.3 days for the general wards (133099 / 8170) - including the period of stay at Clairwood Hospital. For the neonatal unit the mean length of stay was 5.3 days (52862 / 10067).

3.2. Year 1986.

LENGTH OF STAY: The mean length of stay was calculated as being 17.1 days for 1986 on the general wards (139374 / 8174) - including the length of stay at Clairwood Hospital. For the neonatal unit this was found to be 4.4 days (44707 / 10274).

BED OCCUPANCY RATE:

If the Patient Days spent at Clairwood Hospital was known for those who were transferred there from King Edward VIII Hospital, then the true Patient Days for the patients at King Edward Hospital could be deduced (this figure could be deducted from the Patient Day figures supplied by the computer department for 1986, as this includes both hospitals patient days). However, Clairwood Hospital does not keep a readily accessible record of the number of patients transferred from King Edward Hospital, as it considers them to be 'new' patients. The majority of patients admitted at Clairwood Hospital do in fact originate from King Edward Hospital - the hospital is intended to cater for longer term patients who are generally in a stable condition. An average of 6 patients per day are admitted directly from the outpatient department at Clairwood to the wards.
Based on this estimate and the length of stay for Clairwood patients in the various wards, an estimate of the bed occupancy rate at King Edward Hospital was calculated (see Objective 2 a) and Appendix 2). The approximations and suppositions are not of course very accurate, but

indicate that the occupancy rate was in excess of 100 % for 1986. The very high bed occupancy was achieved through a policy of sharing beds in the department: it was considered that this lead to a high cross infection rate and accordingly the sharing policy was discontinued in November 1987.

To substantiate these calculations, an analysis of data collected by the senior consultant on the gastroenteritis ward (who gathered data concerning the bed status in the ward for the period under study) was undertaken. This data is presented below in section 2.4.3 and 2.4.4.

BED TURNOVER INTERVAL: This indicates the mean number of persons using a bed and is calculated by dividing the total admissions by available beds during the same period:

ie. Bed turnover Interval for 1986 = 8174 / 224 = 36.5 patients per bed.

It is not possible to calculate the TURNOVER INTERVAL (the mean interval during which each bed is empty after a patient is discharge, because of the over 100 % bed occupancy.

3.3. Year 1987. This is for a period of 7 months, from January to July.

LENGTH OF STAY: The mean length of stay was calculated as being 16.5 days for this period on the general wards (34338 / 2082). For the neonatal unit this was found to be 4.1 days (9239 / 2262).

TABLE 86 PAEDIATRIC DEPARTMENT DISCHARGES AND PATIENT DAYS

1985, 1986 AND JANUARY to AUGUST 1987

	1985		1986		1987	
	GENERAL WARDS	NEONATAL WARD	GENERAL WARDS	NEONATAL WARD	GENERAL WARDS	NEONATAL WARD
PATIENT DAYS	133099	52862	139374	44707	34338	9239
PATIENTS	8170	10067	8174	10274	2082	2262
AVERAGE L.O.S.	16.3	5.3	17.1	4.4	16.5	4.1

4. The Paediatric Department

4.1. The Paediatric Department gathers inpatient admission figures. These are presented here to show the trend in admissions (Tables 87 and 88).

There has been only a small increase in the number of admissions recorded over the six year period from 1980 (7670) to 1986 (8165) for the general paediatric wards (N1 and N2) (Table 87).

TABLE 87 ADMISSIONS TO THE PAEDIATRIC WARDS 1980 -1986

YEAR	ADMISSIONS
1980	7670
1981	7392
1982	Unavailable
1983	7929
1984	8134
1985*	8170
1986*	8174

* From computer.

4.2. Corresponding figures for the Neonatal unit are presented in Table 88, ranging from 7261 in 1981 to 6397 in 1986, an 11.9 percent decrease from the 1981 figure.

TABLE 88 ADMISSIONS TO THE NEONATAL UNIT 1980 - 1986

YEAR	ADMISSIONS
1980	6734
1981	7261
1982	Not available
1983	Not available
1984	6530
1985	6509
1986	6397

BED TURNOVER INTERVAL (mean number of patients using a bed)

= total discharges divided by beds available during the period
= 6397 / 119
= 57.8 patients per bed per annum.

4.3. The senior consultant in charge of the gastroenteritis ward (N1B) has been gathering statistics for this ward. These are presented to assist in the collaboration of the results. The bed occupancy rate was calculated to be over 100 % for 1986 (Table 89). The admissions have dropped during the first half of 1987 and the bed occupancy has progressively dropped, with an average rate of 94.7 % for January to August.

TABLE 89 AVERAGE NUMBER OF PATIENTS ON WARD N1B PER DAY

1986 - 1987

	1986	1987
JAN	68	46
FEB	71	57
MAR	73	55
APRIL	53	59
MAY	56	57
JUNE	43	51
JULY	38	39
AUG	42	30
SEPT	50	
OCT	53	
NOV	36	
DEC	49	
AVERAGE	52.6	49.3
BEDS	52	52
BED OCCUPANCY (Percent)	101.3	94.7

4.4. Gastroenteritis Ward N1B: Mortality and Bed Occupancy Statistics 1986 and 1987.

Mortality data from the above source was also analyzed (Table 90). Significantly more deaths (in relation to the total admissions and the month of admissions) occurred for January and less for the month of December ($X^2 = 48$; $v = 11$; $p < .01$). This is in keeping with the finding for the wards as a whole (Objective 2 b). Figure 5 depicts the trends in death rates (as a percentage of total admissions per month) - the regression line indicates a steady decrease over the year. Also shown on the same figure is the trend in bed occupancy (average number of patients on the ward per day) for the same period. It must be noted that this occupancy rate averages 101.3 % for the year. As the bed occupancy rate has declined, the death rate has declined: many factors are involved here, but the high bed occupancy would appear to play an important role.

TABLE 90 GASTROENTERITIS WARD N1B K.E.H.

ADMISSIONS AND DEATHS FOR 1986

(Number and Percent)

MONTH	LIVE x	DEATHS y	TOTAL x+y	PERCENT y/x
JAN	218	61	279	21.9
FEB	226	44	270	16.3
MAR	229	58	287	20.2
APRIL	178	23	201	11.4
MAY	197	34	231	14.7
JUNE	160	30	190	15.8
JULY	166	18	184	9.8
AUG	152	23	175	13.1
SEPT	168	23	191	12.0
OCT	164	19	183	10.4
NOV	142	19	161	11.8
DEC	225	12	237	5.1
TOTAL	2225	364	2589	16.3

The corresponding figures for 1987 are depicted in Table 91. The bed occupancy has shown a steady decline (with an average of 94. 7 %; range 113.5 % in April to 57.7 % in August). The death rate has also declined from the rate of 1986, with a mean of 14.3 % of admissions (9.0 % for August - a goal which the department has been aiming for, as it is in keeping with similar units elsewhere * [17]). Figure 6 depicts the trends of bed occupancy and death rates for the ward N1B: the previously implied influence of high occupancy rate on the death rate would seem to have levelled off at lower rates. Attention to other factors would appear to be necessary to further lower and/or sustain the lower death rates attained.

TABLE 91 GASTROENTERITIS WARD N1B K.E.H.

ADMISSIONS AND DEATHS FOR 1987

(Number and Percent)

MONTH	LIVE x	DEATHS y	TOTAL x+y	PERCENT y/x
JAN	138	19	157	12.1
FEB	187	13	200	6.5
MAR	183	33	216	15.3
APRIL	141	21	162	13.0
MAY	113	26	139	18.7
JUNE	119	18	137	13.1
JULY	77	10	87	11.5
AUG	71	7	78	9.0
TOTAL	1029	147	1176	14.3

* Report on the 1983 Symposium : Technical Advisory Group : Diarrhoeal Diseases Control.

FIGURE 5
DEATH RATE / PATIENTS ON WARD
GASTROENTERITIS WARD N1B 1986
KING EDWARD VIII HOSPITAL

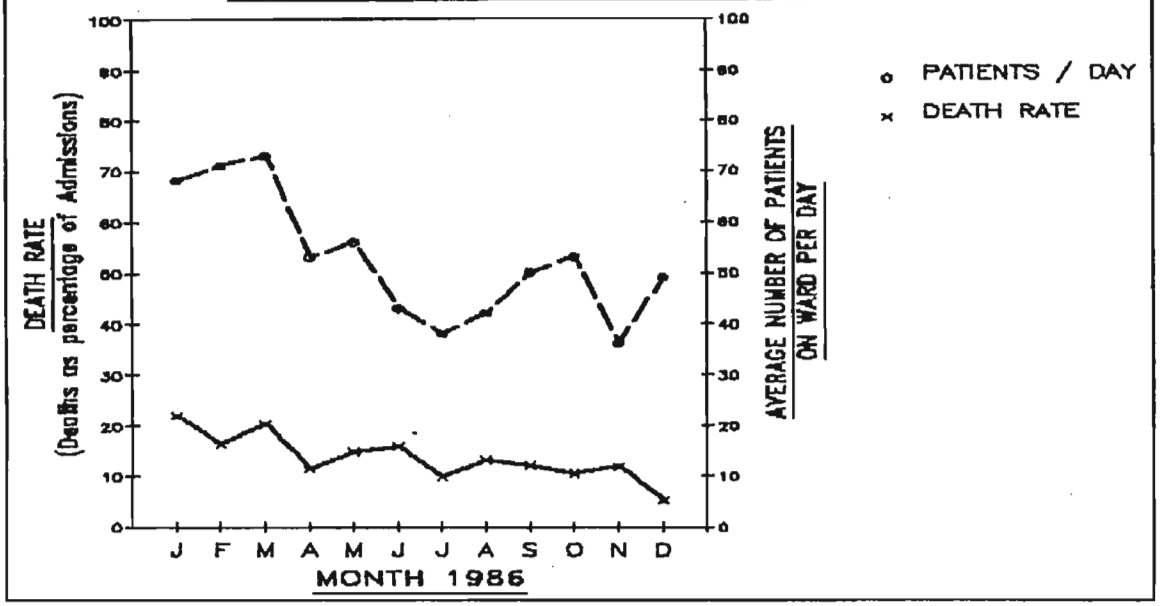
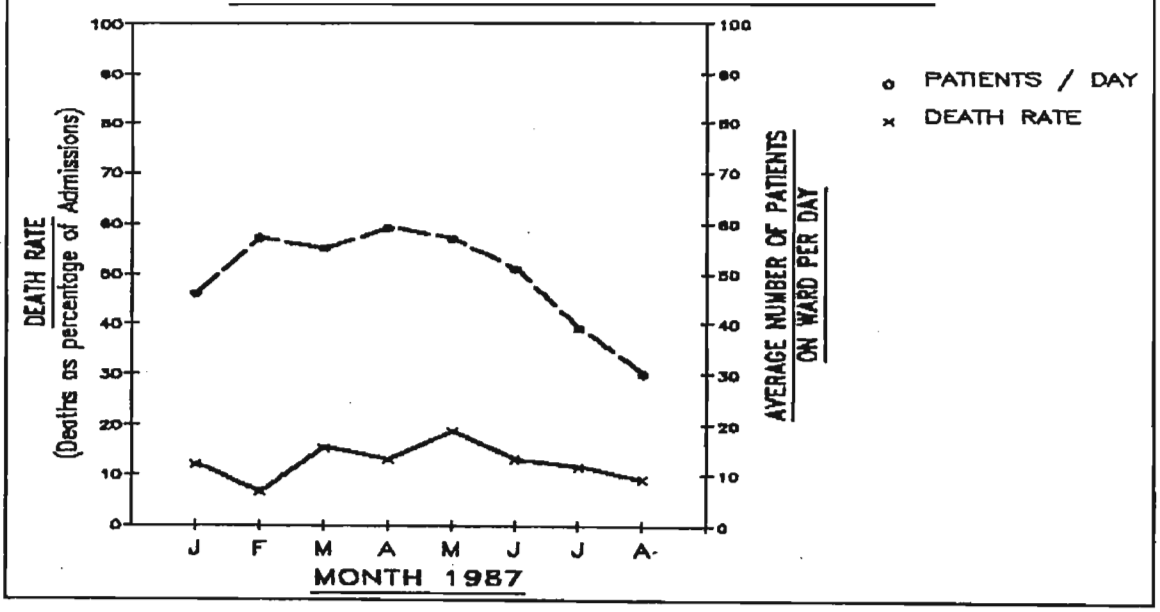


FIGURE 6
DEATH RATE / PATIENTS ON WARD
GASTROENTERITIS WARD N1B 1987
KING EDWARD VIII HOSPITAL



4.5. Neonatal Unit Mortality Rate

The mortality rate, as a percentage of admissions, in the Neonatal Unit was an average 7.5 % over the six year period from 1980 to 1986, with a range of 5.4 % in 1984 to 9.0 % in 1985 (Table 92). This rate has been fairly constant since figures were first systematically collected in 1974.

TABLE 92 NEONATAL UNIT MORTALITY RATES

1980 -1986

(DEATHS AS A PERCENTAGE OF ADMISSIONS)

YEAR	ADMISSIONS	MORTALITY (PERCENT)
1980	6734	7.6
1981	7261	8.3
1982	unavailable	
1983	unavailable	
1984	6530	5.4
1985	6509	9.0
1986	6397	7.3
MEAN	6686	7.5

4.6. A third option is also available to calculate the bed occupancy rates. The Paediatric Department has computerized data concerning their patients which includes the transfer date of patients to Clairwood Hospital. This is, however, not available without extensive programming and time did not allow for this analysis to be undertaken.

DISCUSSION:

The mean Length of Stay for the paediatric general wards is substantially higher than that for the hospital as a whole (17.1 days in 1986 for the wards compared to 6.6 days for the hospital). Specific circumstances are responsible for this and the theme is developed in conjunction with the Survey of Selected Conditions (Objective 2 (d)).

The bed occupancy rates have not been calculated accurately, but the estimates indicate that their was a very high occupancy rate during 1986. The limited number of beds and the long (combined) patient stay would support this finding. *

Another important fact to bear in mind is that the 'beds ' referred to are not always available to any patient. A bassinet, for example, is only suitable for children under the age of 6 months (and then accommodation must be available for the mother in the boarders lodge, to ensure adequate nutrition and nursing of the child). The bed occupancy, when considering the cots, is therefore definitely at a premium, since bassinets are not always fully occupied.

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* See Objective 3 - data for the Gastroenteritis ward.

5. PATIENTS PER DOCTOR

5.1. Table 93 lists the ratio of number of patient per doctor in the Outpatient Department for the period 1981 to 1986.

TABLE 93 PATIENT TO DOCTOR RATIO

PAEDIATRIC OUTPATIENT DEPARTMENT

YEAR	PATIENTS PER ANNUM	PATIENTS/ DOCTOR/ DAY	NO. DOCTORS *
1981	113596	41.5	7.5
1982	122391	44.7	7.5
1983	124072	45.3	7.5
1984	112390	41.1	7.5
1985	110263	40.3	7.5
1986	109460	40.0	7.5

* INCLUDING PRU, part and full time staff

There has been little change over the six year period. It must be noted, however, that the patient load is not evenly distributed; the full complement of doctors is not on duty at one time (part time duties, leave, sick leave etc.). The calculation does not reflect the higher workload over weekends, when there are fewer doctors on duty. Table 94 illustrates this point during the week of the outpatient study, where an average ratio of patients to doctor was 41.6.

TABLE 94 PATIENT TO DOCTOR RATIO MAY 13 - 19 1987

BY DAY OF WEEK

SUN	MON	TUE	WED	THU	FRI	SAT	MEAN
63.3	59.0	37.8	24.6	28.3	30.3	48.1	41.6

5.2. Bed to Doctor ratio.

The number of beds for which a Senior House Officer / Medical Officer is responsible is 28 (224 beds and 8 Medical Officers) on the general wards. Until the reshuffle of registrars in July 1987, each registrar was responsible for 56 beds on average, being accountable to 2 consultants. This has now changed, with an effective 2 registrars per ward (28 beds on average). In effect this means 18.7 beds per doctor before the reshuffle and 14.9 beds per doctor after the reshuffle of staff.

At night 1 registrar and 1 medical officer is responsible for the entire 224 beds, and with additional responsibilities in the respiratory and resuscitation units.

Prior to the reshuffle in July 1987 the position in the Neonatal Unit was that 2 registrars and 3 medical officers had charge of the 120 (119) beds. 1 registrar and 4 medical officers are now full time in the unit. The total ratio of beds per doctor remained at 24 (for this high care area).

5.3. Bed to Nurse ratio.

In the **general wards**, there are a total of 78 nurses for the 224 beds, including 4 registered nurses. During the day this means a ratio of 2.9 beds per nurse overall, including a ratio of 14 beds per registered nurse.

At night the total bed to nurse ratio is 7 beds per nurse, including 1 registered nurse per ward (average 56 beds).

Several factors must be considered here: 27 % of the day nurses are student nurses. It must again be remembered that not all nurses are on duty at the same time (lunch, tea, varying day shifts). A particular problem is noted at night, and especially so in those wards requiring more intensive patient care. The gastroenteritis ward, for example, usually has a large number of patients on intravenous therapy, which require close monitoring. The number of relief nurses available for various duties are apparently not enough (communication with the Paediatric Matron).

In the **neonatal wards**, there are 45 nurses for the 120 beds (119 in 1986), including 23 registered nurses. During the day this means a ratio of 2.7 beds per nurse, with 5.2 beds per registered nurse. This reflects the intensive care nature of the work *. Many of the nurses during the day are student midwives, so although they are registered nurses, they are at various stages in their training to deal with the neonate (all of whom have conditions which require specialist care in the unit).

At night 25 nurses are responsible for the 120 beds, including 3 registered nurses. The bed to nurse ratios are 4.8 beds per nurse (total) which includes a ratio of 40 beds per registered nurse. It must be noted that an important part is played by student midwives at night as well.

Similar factors mentioned which apply to the general wards also apply here: the responsibility of the registered nurse staff at night is considerable.

Limitations of Availability and Accuracy of Information

Several areas pertaining to inadequate information gathering for outpatients have already been found (for example, inaccuracy of outpatient statistics - under reporting of consultations, no information of number of outpatients seen on the wards, lack of linking of patient data with the different services, no information relating to follow up of patients once discharged from the wards, no routinely collected information on the disease profiles of presenters, no information on need or demand, etc). Similar findings regarding the lack of meaningful information to allow a rational appraisal of the use of services were found in Britain prior to the adoption of newer methods of looking at information for management purposes [18] in the 1960's.

There are several limitations to the available information on inpatients, for example, the Annual Hospital Returns. This is also reflected in the Monthly Returns from which the information is gathered for these annual figures. The paediatric component is not separated into the disciplines (medical, surgical or consultants) - all patients under the age of 12 years are simply classified as paediatric. The patient statistics are gathered from the 'midnight head counts'; the surgical and medical paediatric wards are, however, totalled together on a daily basis. There is, therefore, no efficient mechanism to find the patient days for the paediatric department on a routine basis; hence the system does not lend itself to calculate individual bed occupancy or length of stay characteristics for any

* The mortality statistics are discussed under Objective 3.

department. This has already lead to several misunderstandings over which department is responsible for 'under utilizing' available beds.

The usefulness of the information collected on the Provincial computer system is also limited. Several problems were found in this regard: i) initial information is coded before it is assessed by the registrars and consultants, with little feed back if changes are required, ii) although the staff who code are competent and experienced, the coding is bound by the written information on the records (which have been shown to lack the necessary detail in many cases), iii) the anomaly of Clairwood Hospital patient days being recorded as King Edward VIII Hospital days, with no reference to transfer dates and numbers, iv) 'admissions' to the Neonatal Unit who are not admitted, v) no method for ensuring completeness of data, vi) no separation of information on a ward by ward basis (wards N1A and N1B, for example, are all classified as ward N1).

Individual record tracing is one of the major uses of data captured on the computer at present, but ward and disease profiles would be suitable routine information which could be used by the Administration and the individual departments. The Community Health Department, for example, has initiated the gathering of certain indicator diseases as of 1984: the usefulness of this information will be greatly improved when the data received becomes more complete and accurate.

Medical information is unique, in that there is a need for specialist information to be made available to management [19]. A clinically orientated model is required in order to achieve this: the process of setting up information systems to meet these stringent and varied requirements is a task of enormous proportions with unique problems and challenges [20]. Detailed planning is required [21], with particular attention being paid to gathering relevant information, precise definitions and the capacity to change within a continuing evaluation programme [22 23].

Apart from the need for summary statistics, the vital role of accurate and complete medical records cannot be over emphasized [24].

QUALITY OF CARE

(Objective 4)

This chapter serves as a summary and conclusion of the various findings discussed in the study. **The reader is referred to the relevant sections for detailed description under each heading.**

1. ROUTINE STATISTICAL DATA

The inadequacy of the routinely collected data concerning the outpatient department and the specific wards must be noted. For example, utilization data for the Outpatients Department does not take into account all the consultations undertaken, no profile of diseases is gathered and the medical records kept do not reflect all the treatment ordered or given. For the wards, there is no routine mechanism for analyzing length of stay of patients, bed occupancy rates and again the medical records are incomplete.

As a result, there is no means of linking resource utilization to the number of consultations / discharges, individual wards, medical teams, nor specific disease entities. Management not based on this type of information would seem to be ad-hoc in nature. Likewise, there is no mechanism for rational assessment of effectiveness of therapy.

2. UTILIZATION OF THE PAEDIATRIC DEPARTMENT 1986

A. While the number of attenders at the Paediatric Outpatient Department has shown a slight decline, the attendances were in the main in respect of first attenders of a young age group. They present with a more severe stage of disease in very many cases compared with earlier years. This has lead to a concomitant increase in demand for admission and for the alternate 'review during current visit ' service, thus maintaining or even increasing the workload in the department.

The Procedure and Resuscitation Unit is operating as a high care ward, without the benefit of ward staffing (medical, nursing, clerical) and facilities. The purpose of the unit is, inter alia, the preparation of patients for discharge or admission as necessary.

There are also many other patients under observation in the Department (particularly pneumonia cases). In this regard, the need for upgrading the facility is heightened by the need to care for several very ill patients who need admission but who may remain for extended periods in the outpatients under observation instead.

B. No specific statistics on the Paediatric Medical inpatients or individual wards are kept by the Administration (including bed occupancy) and therefore are not available for management purposes on a routine basis.

The admissions to the wards have steadily increased from 1980 to 1986 and the bed occupancy was very high during this period (with an evening off during the latter half of 1986 and into 1987). There is a very high cost factor associated with high bed occupancy. The cross infection problem has been mentioned already and, when seen in economic terms, more efforts to prevent cross infection should be made: a study in the United States has estimated that at least 5 % of hospital admissions will get an infection in hospital, costing an additional 1 billion dollars to the health service - increasing the length of stay by a few days could double this figure [25]. Unpublished data submitted to the Administration in September 1987 confirms similar findings in the Paediatric Department.

According to the criteria adopted in this study, the number of bed days available did not keep pace with the demand during the 1986 study period. Patients who required admission were not all admitted as a consequence. The bed position was not created by inappropriate admissions, nor by inappropriate length of stay of patients - although this may be reduced by closer attention to such areas as metabolic and fluid management and reduction of cross infection. Many factors are involved here, several of which are common with problems found in industrialized countries many years ago [26]. In fact, in the Low Weight conditions in the neonatal unit and the Protein Energy Malnutrition cases in the general wards, about 10 % of patients were found to have been discharged prematurely according to the weight criteria used.

The intention of the gastroenteritis ward is the provision of a facility which is dedicated to the care of patients with a particularly infectious disease, needing a high degree of attention. The decrease witnessed in the mortality trends in 1986 indicates that the outcome of patients has improved as a result of this ward. If the lower bed occupancy rates being experienced in 1987 are maintained, a further audit of medical records using the same criteria would be of great value in assessing the role of high occupancy levels and the quality of care provided.

C. The admissions to the Neonatal Unit have declined by 11.9 % from the 1981 peak to 1986. But the bed occupancy rate remained at a premium. Some patients were discharged before fulfilling the required criteria (as many as 10 %), but there were minimal inappropriate admissions. (The demand on the department from the Obstetrical Unit was not specifically studied.) Other studies in South Africa have emphasized the need for intermediate and high care beds for the neonate [27] and the Natal area with its urban and rural population mix is likely to have even higher demands. This is even more important when considering that, universally, while improved survival amongst the low birth weight infants has been high in recent times, this has not been parallelled by a reduction in the birth of low weight infants [28] [29].

D. Much of the work in the department is in respect of infectious conditions; preventable factors play an important part. This is in keeping with findings elsewhere. In-roads will not, however, be made into the actual prevalence of these conditions by attention to problems in the hospital setting alone. The question of measles infection, for example, needs to be more actively linked to the preventative programmes in the community [30]. While this does not at present fall within the domain of the hospitals (the Department has a major involvement in its own right), hospitals are in a unique position to contribute to the epidemiological knowledge of the disease and should adopt a more aggressive attitude to promoting the effective implementation of immunization policies at all levels to which it has access. Several other illnesses responsible for high utilization of the hospital and Department should likewise be linked to effective programmes in the communities from which the patients come. The new health dispensation has in theory paved the way for a comprehensive health service (albeit in a additionally fragmented manner), in which hospitals have an integral part to play. King Edward VIII Hospital,

linked as it is to the medical and nursing training establishments, must surely lead the way.

Cost efficient means to combat the rising demand for services can only be directed to preventative procedures and other primary care features in the community itself, including immunization practices, health education, peripheral clinic availability, utilization and referral systems. These measures could rapidly decrease the demand for high care curative practice at King Edward VIII Hospital. The responsibility for the patient extends beyond the gate.

3. MANPOWER

There are no universally acceptable norms for doctor / nurse / patient / bed ratios, and it would be misleading to compare King Edward VIII Hospital with other institutions.

A. MEDICAL STAFF

i) The overall ratio for doctors to patients in the outpatient department may seem reasonable, but is subject to variation on different days of the week and different times of the day. It must also be viewed in the light of the more serious nature of the conditions presenting. As with most outpatient facilities, the majority of patients are seen in the mornings to facilitate the use of x-ray and laboratory services and hence the actual time spent on each patient is not reflected as a simple division of the number of patients seen by the number of hours on duty. A workstudy approach will be needed to confirm the researchers observation that five minutes of attention per patient is usual; several other patients are usually observing the proceedings to facilitate a rapid throughput. Rearrangements regarding this system would of cause need to take into account the problem with late afternoon transport which most patients have to face if they are not seen until late in the afternoon.

ii) Doctors on the wards. While the number of posts has increased marginally since 1981 (37 to 39), the ratio of one medical officer to 28 patients on the wards has not changed. The recent redistribution of registrars has increased the number of registrars to 2 per ward (effectively). This has, however, been

at the expense of a registrar post in the Neonatal Unit, the effect of which is yet to be seen. While this may not be entirely in keeping with other institutions, it is thought that this will help to improve the situation. Another useful innovation has been the incorporation of a additional consultant on Ward N1B (to make up the staff quota).

iii) Because of the nature of the work undertaken in the Procedures and Resuscitation Unit, serious cases require monitoring throughout the day and night, with a resulting high demand on staff time. However, many ward cases also have conditions which demand close monitoring; this study indicates that this function is not being undertaken adequately. The large number of patients needing this attention may indicate the need for more staff to fulfil this role in the event of patients not being adequately dealt with prior to admission from the PRU or despite such preparation. Most cases so identified were in respect of children suffering from hydration and/or metabolic complications of gastroenteritis and pneumonia cases.

iv) The Neonatal Unit is a high care area where 1 registrar and 4 medical officers have the responsibility for the 120 beds (24 per doctor). Before July 1987, 2 senior registrars were employed in the unit; it remains to be seen if the present arrangement will be effective (although the same total number of doctors are available, there is only one senior registrar). The high occupancy rate and high turnover rate (with shared bassinets) leads to a high demand on these doctors and increases the incidence of cross infection. Night cover is by one doctor full time in the unit.

B. NURSING STAFF

i) The ratio of 1 nurse to 3 beds during the day on the general wards is favourable, although this does not of cause mean they are available for nursing duties at all times. Problems are especially apparent at night, where a single registered nurse is responsible for an average of 56 beds (when she is on tea and lunch breaks no registered nurse is available on the ward). This is particularly acute on the gastroenteritis ward, since many patients are under 4 years of age and on intravenous therapy. In the light of the findings of this survey (which indicates that fluid and electrolyte management is not entirely satisfactory), this staffing aspect is of vital importance.

ii) A similar situation exists in the Neonatal Unit, with a favourable ratio of 1 nurse to 3 beds during the day. But at night the registered staff are responsible for 40 neonatal beds each, many of whom are undergoing intensive care.

The vital role of students in the Department must be noted - the numbers given above include the student nurses and midwives, who are at varying stages of their training - the amount of responsibility they take must vary according.

The whole question of manpower planning has to be addressed separately. Many factors will need to be taken into account, such as considerations that 1 long stay bed would cost the equivalent of over 5000 immunizations, or over 480 sessions of a doctor in a clinic and that up to 35 nursing auxiliaries or 8 nurses can be trained in the place of 1 doctor [31].

4. **PROCESS OF CARE: SELECTED CONDITIONS.**

The findings in this regard are likely to apply to many departments in most hospitals and not just to the Paediatric Department.

A. The study of selected conditions for both the outpatients and inpatients highlighted the anticipated problems of medical recording. Much information is not available. Data is often not recorded and if recorded, is often not kept. While all details cannot become a permanent part of a patient record, there are those which are considered to be vital. This is particularly so from a legal point of view. Large areas of missing data would be very hard to defend in

cases of litigation. As in several other countries, the monitoring of medical practice is likely to became an important issue in South Africa. The main motive for this may be cost efficiency and cost containment, particularly when the profit motive is involved. Peer review within the profession is also becoming a necessity in the face of public demand. Medical audits are based on an assessment of the medical record. Records also form the basis of medical information systems, which are essential to the efficient and effective management required to match increasing demands to limited health funds.

Weighting of the various components of the process of care was not undertaken. Instead, the major areas of concern (non-compliance with the established criteria) have been ascertained. The discussions under each heading should be consulted for all the details, as only a summary is presented here.

B. A particular area of concern related to fluid and electrolyte management of patients. The importance of these factors cannot be over emphasized: the most important factors contributing to the mortality risks in diarrheal diseases are hyper- and hyponatraemia, hypoproteinaemia in the malnourished state, and hypocarbonaemia [32]. There is need for intensive management in these fields [33].

i) From the Outpatient study, it was found that many admissions were related to metabolic disturbances, despite management in the Procedures and Resuscitation Unit (the main task of which is to prepare the patient before admission). Pre-admission monitoring of electrolytes is not being adequately performed in many cases. Similarly, patients initially assessed as having severe metabolic abnormalities are often not adequately monitored prior to discharge from the department. The actual orders of the doctor relating to fluid type and quantity could not be fully assessed because of missing information. These orders do not form part of the permanent patient record, in spite of the fact that they are the most critical prescription item for the young, ill, dehydrated patient.

ii) In the in-patient study, similar results were found. Again, records of doctors orders relating to fluid management are not often available. Monitoring of electrolytes was also difficult to assess because of missing information, including those where severe abnormalities had previously been recorded.

iii) Those records which could be assessed in respect of doctors orders indicated that there may well be a problem in the area of fluid management: about 10 % of the cases reviewed did not comply with the standards set down. Coupled with the finding that a certain minimum of patients were not adequately monitored and metabolic supplementation was not always complied with, it is apparent that a group of patients did not receive optimum fluid and metabolic management.

iv) Attention will also need to be directed to the availability of flowmeters and infusion pumps in the department, since the effective rehydration of young patients requires careful control of fluid volume. Although this issue was not directly investigated, 6 flowmeters for the gastroenteritis ward (52 beds and an occupancy rate of over 100% in 1986) would seem to be inadequate.

v) Review of the patients in the PRU, according to the criteria, was adequate in the majority of cases where this could be assessed. If it is assumed that when a patient on the ward is assessed by the doctor that an entry is made in the notes, then as far as the ward cases are concerned monitoring is poor. Even if the assumption is not entirely true (or the record was not made in the correct place) it is probable that night monitoring of patients is minimal, considering the patient to doctor ratios. This essential task is not likely to be conducted adequately by the small trained nursing contingent at night.

C. Hospital - acquired measles infection has been shown to be particularly severe [34] and with the pattern of admissions as they are [35], the place of immunization must be emphasized. This includes the re-immunization of those children who may receive immunization early in life [36] [37] and those who only receive immunoglobulin. Measles infection leads to complications in some 10 % of cases, 25 % of whom will have long term sequelae [38]. This problem is more acute in hospitals, since it can cause unnecessary mortality amongst immuno-compromised patients, for example, in acute lymphoblastic leukaemia sufferers, despite the use of immunoglobulins.

Although a good attempt is made to ensure that all susceptible patients are immunized against measles on arrival at the outpatient department, there are periods (over weekends and at night) when patients do not receive this benefit. The recording on the Road to Health card which the mother takes home with her is important, but it is also important that the patient record (in-patient and out-patient) reflects the immunization status. Patients will continue to be infected in the hospital setting, but increased attention to this facet and improved recording will decrease this number and modify the outcome in the rest.

D. The precautionary prescription of antibiotics is common practice, and considering the circumstances in which it is done, will probably continue for some time. Nevertheless, it constitutes inappropriate use of drugs. Investigation requirements are often not met in the outpatient department. The need for the patient to return for the result may be partly responsible for this. Similarly, on the wards investigation criteria prior to administration of antibiotics are not met in many cases. Whatever the reason, one must not lose sight of the fact that King Edward VIII Hospital is a teaching institution for both nurses and doctors.

E. Although affecting smaller numbers, there were other areas where findings will need to be confirmed because of the potentially irreversible effects on the patients.

i) The serological results of the mother with respect to syphilis are not adequately recorded. The condition is relatively common and failure to treat early and appropriately could have long term detrimental effects on the infant.

ii) The requirements regarding the taking of blood gases and the subsequent action were not met in several cases in the pneumonia and low weight groups studied. Failure to take appropriate action when required can obviously be very detrimental to the patient. Some cases may be due to the unavailability of ventilators or technicians or malfunctioning of equipment, but no mention of this was made in the records.

F. Follow up arrangements are made directly with the patients where applicable and with the guardians, verbally and by an appointment card. No record is usually made in the patients notes, apart from occasional requests in specific cases.

Several specific areas have been highlighted in this study. Each will need to be confirmed and reasons for any problems investigated as necessary. While reasons such as low moral because of working pressure and working conditions will influence the quality of care provided, other factors need to be considered as well. These are common to the profession as a whole. For example, the duty to institution investigations and therapy which a condition requires once diagnosed, and the responsibility to follow up individual patients until appropriate management has been instituted or the patient has been formally handed over to another responsible person. These factors become all the more important as the external factors (such as high bed occupancy and staff workload) decrease in importance, a trend which may be establishing itself at the present time.

5. MORTALITY RESULTS AND IMPLICATIONS

In discussing the mortality statistics on the wards, the higher death rates for the under 1 year old group was highlighted. These cases could generally be considered to require a higher degree of skill and amount of time in their management. The finding that for 1986, a significantly higher death rate occurred in January in relation to the other months of the year was discussed. When the mortality rate on the gastroenteritis ward was considered on a month to month basis for 1986 and 1987, the declining rate of bed occupancy during the period was noted to coincide with a decrease in morbidity. This possible association could well be explained by decrease in cross infection in the ward. The improved staff to patient ratio must also be considered: this is particularly so where the nursing staff are concerned, since their duties are primarily on the ward and any additional time available allows more attention to tasks. Given that these assumptions are correct, then the other major factors leading to mortality and morbidity would remain (the disease itself, severity, quality of care) and become more important as determining factors in the rates. These factors would then become the limiting factors to any further change in outcome measures. The fairly consistent mortality rates in the Neonatal Unit may indicate that this balance has been reached (although occurring with a high occupancy rate, the demand - largely

created by the Obstetric Unit in the hospital - and the nature of the conditions has apparently remained constant).

6. QUALITY OF CARE MEASUREMENT

A. It is important to note that the Paediatric Department has a policy of quality control in operation; several other departments have a comparable system. It is, of cause, a requirement that all registrars summarize the patient notes of all the patients under their care. These are then scrutinized with the record by the senior consultant under whom he works. In addition to the normal ward rounds, special teaching sessions and tutorials are attended for 4 to 5 hours per week. The Perinatal Mortality meetings are regular weekly meetings to discuss perinatal deaths, in conjunction with the obstetricians where decisions as to the likelihood of the circumstance being preventable or not are discussed in detail. Attempts are also made to discuss each death on the general wards with all involved in the treatment of the case. The department has also tried many innovative ways to improve the situation on the wards as they see them, such as convincing the administration to convert the previous general ward into a gastroenteritis specialty ward and, recently, a reshuffle of staff duties. They are also committed to the collection and analysis of data of all aspects of their work and have computerized much of their patient data in the department. These factors contribute to the fall in mortality which has occurred over the last 10 years in the department. This commitment is also evident from their willingness to participate in a survey of this nature.

B. In general, when the question of 'medical audit' is addressed the most common reactions are defensive. What is needed is a constructive response, since the demand for the profession [39] [40] to become more accountable for its actions is not confined to other countries alone [41].

Concern for the quality of care is not new in South Africa. Many pressures have brought this about, not the least of which is public concern about the mounting costs of care. Concern is also expressed about the difficulties and possible costs of evaluating these services, although the measurement of quality need not of itself be expensive, nor highly technological. Health care possibilities will probably always outstrip available resources [42] but money will, however, need to be spent on developing systems to enable realistic

appraisals of this nature. Evaluation of health care requirements and quality will need to be based on assessments of the achievement of the providers [43] [44].

In South Africa the Medical Association Of South Africa constituted its Cost Awareness and Peer Review Committee to deal with complaints about medical conduct and care given. The committee consists of 7 members (2 of whom represent medical schemes): most cases were dealt with at Branch level. In 1986, 69 cases were dealt [45] with, of which only 12 complaints were not substantiated. This is probably a small indication of the needs in this area: the methods of investigation used to evaluate quality of care are meticulous and hence are very time consuming. An important factor to remember here is that the work of this group is limited to those cases which are brought to the attention of the Association only. It is difficult to apply a more comprehensive system within this framework. In addition, several attempts by individual doctors have been undertaken to assess their own practices, in a variety of ways [46].

The medical industry is actively being privatized and although the expectations of the public differ from country to country, similar patterns are developing here as did in the United States some years ago. Public, union and economic pressures are likely to bring about comparable reactions: the need for more extensive evaluative systems and population-based data is already becoming an essential element to the practice of good quality medicine.

C. Recently the American Medical Association [47] outlined the current types of quality control in the United States. Three basic approaches are recognised; namely, prospective, immediate and retrospective. The prospective techniques involve the establishment of protocols (standardization) for care, procedures, and education and training policy. Immediate medical control refers to techniques to be used in a preventive manner, by providing real-time / on-line help via sophisticated communications networks. The mainstay of the retrospective approach is the field assessment form of review of hospital and other cases (systematic and statistical review systems). These practices are already beginning to emerge in the Republic, and it is essential that the medical profession itself establishes the standards before those with vested interests set up their own goals.

D. The establishment of Quality of Care Evaluation Programmes, linked to cost efficiency and cost effectiveness assurance programmes has become a necessity and not an expensive luxury. To this the current views of the American Medical Association are considered relevant to South Africa today, especially when the direction in which the health care system is proceeding is noted. The concepts outlined in Appendix 13 could serve as a guide to the establishment of such programmes.

RECOMMENDATIONS

(Objective 5)

Several recommendations can be made as a result of the findings of this study. They are listed under three broad headings: Routine Statistics for Managing; Medical Management Issues; and Quality of Care and the Professional. Recommendations for suggested early implementation are made, as well as possible longer term measures.

1. ROUTINE STATISTICS FOR MANAGING.

A. Immediate Measures.

i) Systematic collection of Outpatient data. As part of routine Administrative duties, the systematic collection of data should be improved. This should include data on the following (on an individual and collective basis):-

a) all consultations (including the cases reviewed during observations in the Outpatient Department and those patients seen in the corridors of wards)
b) age of attenders
c) presenting diseases
d) indicators of severity of the conditions
e) outcome of consultations.

Standard definitions must be used and particular attention must be paid to accuracy and completeness of all data.

ii) Systematic collection of Inpatient data should likewise be improved. This should include data on the following (on an individual and collective basis):-

a) admissions / discharges
b) length of stay (separately for King Edward Hospital and Clairwood Hospital days)
c) bed status
d) age of patients
e) diseases
f) indicators of severity of conditions
g) outcome of admissions.

This should be on a ward by ward basis; in the longer term this could be gathered on a consultant team basis as well. Emphasis must again be stressed on the need for accuracy and completeness of the information gathered, as this data is intended to be **used.**

iii) The above data should be collated monthly to serve two purposes:

a) Fulfillment of required returns to Head Office.

b) For use at the local level.

(1) The results should be expressed in terms which indicate various factors of utilization, output and outcome (for example, bed occupancy rate, patient / nurse / doctor / bed ratios). Collected over time, this information can be correlated with morbidity and mortality related factors.

(2) The results should be presented in an easily understood form, such as using graphic display and models wherever possible.

(3) The information is to be made available for assessment by an interest group involving representatives of management, administration (records, expenditure, personnel, etc.), medical, nursing, pharmacy and laboratory personnel as required. The group would share the duty of collating and analyzing the data, and should be given the authority to adjust mechanisms and methods (after consultation) to the needs of the Department.

As this will be based on ward by ward data, and it will be possible to weight the data for case mix, the true workload can be determined. Facts gathered over time can lead to more accurate assessment of need; for example, manpower (type required, number required, where they are needed, when required, and what training is essential), equipment (beds, incubators, infusion flowmeters, etc.).

Problem areas will be more easily identified, the problem quantified and analyzed and the necessary steps implemented and evaluative steps planned to provide solutions. Flexibility of shared management would be essential, in order to give innovative ideas a chance to work.

iv) Medical Records:

a) Improvements to individual patient records must be initiated. Important points are accurate and complete documentation, including:
   (1) clarity of description of presenting complaints, history and examination
   (2) documentation of investigations undertaken, results and action taken
   (3) documentation of procedures performed, results and action taken
   (4) accurate recording of any complications and action taken as a result
   (5) differential diagnoses clearly stated, in terms of the International Classification of Diseases.
   (6) full details of all therapy prescribed: prescriptions should be retained, clearly annotated, legally signed and in the correct place on the record
   (7) follow up arrangements to be detailed.

b) Clarification of what recorded data must be retained as part of the permanent record should be arrived at. (Some may need only be kept until summarized, but record of its content should be made in summary or other certified form.

c) Specific items needing more accurate and complete documentation:
   (1) the measles immune status of patients at each attendance, (particularly the first) and action taken, if any
   (2) metabolic and fluid management (orders, quantities delivered, results and written conclusions of investigations)
   (3) laboratory reports in general.

d) Full co-operation between records staff and the Department should be established: this would facilitate staff development to increase accuracy, completeness, usefulness and acceptability of the data entered onto the computer and submitted to Head Office. Much duplication of effort is taking place, with the Administration and the Department implementing their own computerization strategy: this requires closer scrutiny in order to achieve an improved information system.

B. Long-Term Measures.

i) Because of the efficient data handling ability of computers, consideration should be given to the **direct** entry of relevant data into suitable computer management programmes.

ii) The Inpatient computer system needs upgrading to allow for flexibility of data collection and manipulation.

iii) Routine feedback mechanisms need to be developed so that the data can be used at the local level for management (including quality of care evaluation, cost efficiency and cost effectiveness) and research purposes (this is conducted entirely by special request at present and for specific research interests only). The type of information required has been discussed.

iv) Once the accuracy and completeness of data is assured, routine analysis could be undertaken directly for Head Office use for the required routine statistics. Clerical staff would be released to fulfil other, more patient directed functions such as record maintenance and follow up procedures. (The problems anticipated in the past regarding, for example, the multiple transfers between Clairwood and King Edward VIII hospitals can be overcome with modern programming techniques and equipment.)

v) Record linkage of outpatient and inpatient records is the ideal: this may be more efficiently achieved by a separate paediatric record division (staff and facilities). This would assist in achieving greater co-operation between the medical and administrative staff, with improved documentation of the patient and other records.

Finally, linkage with future population based data bases would complete the system.

2. MEDICAL MANAGEMENT ISSUES

A. Immediate Measures - Outpatients

i) Improvements should be implemented to cater for the needs of all patients under observation in the Department:

a) The Procedure and Resuscitation Unit needs to be upgraded to full ward status, including full staff and equipment requirements. The high care nature of the work requires 24 hour cover and this must be taken into account.

b) A formal structural arrangement should be made for the large number of cases which are not under the care of the Procedures and Resuscitation Unit. The object is to provide basic facilities for identifying and monitoring these patients adequately, during the day and night. This requires allocating staff to perform this duty in a specifically laid out area, where there is some degree of screening from the general mill of the busy department. This could be within the present building, if a suitable nearby facility is not available.

ii) Concerning manpower and equipment requirements, recommendations can only be made once accurate and complete information becomes available. If standardization of collection of data along the lines suggested is carried out in other similar institutions, direct comparisons will be more applicable (since correction for case mix will then be possible). This will also be the situation with bed and other equipment requirements.

iii) To meet the needs of the Procedure and Resuscitation area, further practical training in the accurate and conscientious management of patients is required, particularly in the fields of fluid and electrolyte therapy of the ill young and those with multiple problems such as pneumonia, malnutrition and gastroenteritis.

iv) More ready access to the biochemical monitoring facilities for patients is required: special arrangements with the laboratory staff are needed to arrange for a full service.

v) Training in the accurate, conscientious monitoring of those under observation needs to be emphasized. This is a vital function, as the early recognition of problems, especially in the absence of medical staff is essential for improved outcome of the patient.

Protocols of action to be undertaken are effective means to achieve this. The routine analysis of these procedures should be undertaken to ensure that they are being adhered to and standards are maintained.

vi) In recognition of the major contributory problems caused by measles infection, particularly in the hospital setting, several measures should be instituted. These include (1) accurate and complete recording (2) the implementation of a revised immunization policy at night and over weekends, and (3) attention to adherence to the immunization protocol which is already in place.

B. Immediate Measures - Wards

i) Manpower and equipment recommendations are subject to the same comment as under outpatients.

ii) The specific problem areas identified need to be subjected to further investigation and confirmation. These include:

(1) the fluid and electrolyte issues.

(2) more intensive care of Protein Energy Malnutrition sufferers, warranted in order to make more of an impact on the patients' health status prior to discharge.

(3) results of investigations should be recorded and written comment on any necessary action recorded (including and especially when the patient has already been discharged !).

(4) particular attention should be paid to potentially irreversible effects resulting from failure to initiate investigations, take action in response to, or inappropriate response to, such factors as blood gas analysis and syphilitic serology.

(5) active education programmes need to be instituted to reduce the patient load in the Department (Outpatient and Inpatient); oral rehydration, breast feeding, immunization and hygiene.

C. **Long-Term Measures.**

i) The decreased bed occupancy rate which started in 1986 and continued into 1987, could allow for the admission of a number of additional patients (identified as requiring admission according to the criteria employed). This would, of cause, be at the cost of the favourable outcome which is apparently resulting from the lower bed occupancy.

ii) Therefore, the question of the number of beds and related factors must still be addressed if improved patient outcome is the ultimate goal.

The most efficient methods available to analyze this problem require accurate and complete data concerning all facilities catering for these patients in the community: this information, for example, would include demographic data and data concerning all clinic and other hospital facilities in the catchment area of the hospital. This is necessary in order to establish if the present decline in utilization of both inpatient and outpatient facilities is a continuing trend, before forecasts can be made. Efficient use of all facilities, combined with correct utilization of primary health care techniques may decrease the needs for additional beds in the future.

iii) The Gastroenteritis Ward caters for the ill dehydrated patient with gastroenteritis, but other groups of patients also require more intensive care. This is particularly so for the very young. The higher demand these patients make on the staff may require that a high care area be established, similar to that of the Neonatal Unit.

Such an area would serve all the paediatric wards, and would have suitable laboratory facilities available: a 24 hour unit of this nature would also cope with the demands for these services at night and over the weekend coming from the Procedure and Resuscitation Unit in the outpatient department. It could

possibly take over the functions of the Paediatric Respiratory Unit - if facilities were expanded - so that this expertise would be available for a wider group of patients.

iv) The Paediatric Department, as part of the King Edward VIII Teaching Hospital, should continue and extend its efforts to play a major part in the comprehensive medical programme in the community it seeks to serve.

Only in this manner will the efficient and effective use of its resources be attained and an impact be made on the health of the community.

3. QUALITY OF CARE AND THE PROFESSION.

A. Paediatric Department

i) The Department should continue the measurement of the utilization and quality of care of the unit.

ii) Consideration should be given to the establishment of a total management system for the Department, including quality of care evaluation. A joint system between the Department and the Administration would ensure efficient and effective management of resources to meet current and future demands.

B. The Profession

The medical profession is renowned for its independent stance. This independence is being challenged, with external forces insisting on cost containment and high quality care. The professions response may be defensive or constructive. The choice really is whether to construct the minimum set of essential standards or leave it to other sectors of the health industry to do. As the criteria set will have to be mandatory to be effective, there is a growing need to develop a new interdependency amongst all in the health team.

The academic hospitals are in a favourable position to initiate such practices.

ACKNOWLEDGEMENTS.

I wish to thank the Director of Hospital Services, Dr J. Morfopoulos (Chief Hospital Superintendent of King Edward VIII Hospital) and Professor A. Moosa (Department of Paediatrics, University of Natal) for permission to undertake this study.

I am especially grateful for the superb co-operation of all the Paediatric and Administrative staff (the Consultants, Medical Officers, Registrars and the nursing staff, as well as the clerical personnel who assisted with data collection). Special thanks is extended to the Records and Computer sections for their untiring enthusiasm and hard work.

APPENDIX 1 PROTOCOL
AS AMENDED March 1987

QUALITY OF PAEDIATRIC CARE
AT KING EDWARD VIII HOSPITAL

PURPOSE

To assess the quality of care provided by the Department of Paediatrics (the Department) at King Edward VIII Hospital (KEH).

OBJECTIVES

1. *To identify manpower, accommodation and other material resources available to the Department.*

2. *To ascertain characteristics of the "process" of care (including utilization).*

3. *To identify and quantify "output" and "outcome" characteristics.*

4. *To assess quality of care, utilizing process, output and outcome characteristics and selected resource levels.*

5. *To make recommendations, where considered appropriate, concerning areas of possible improvement.*

DEFINITIONS

1. *Paediatric Department - The Department of Paediatrics of the University of Natal which is responsible for the paediatric outpatient and inpatient care at King Edward VIII Hospital.*

2. *Process characteristics - aspects of patient care (eg. examination, investigation, treatment, admission, discharge) and bed occupancy rates, length of stay, profile of diseases treated.*

3. *Measures of Output - eg. total and selected case - specific discharge rates.*

4. *Measures of Outcome - eg. total and selected case - specific death rates.*

6. *Resources - manpower (medical, nursing, auxiliary, clerical, students, domestic), equipment and other material resources.*

REDUCTION OF BIAS

1. *Standard questionnaires and checklists will be used.*

2. *All cases with the selected conditions attending during the study periods will be included in the study.*

3. *All collation and analysis will be undertaken by the researcher alone.*

4. *Standard criteria for the measurement of quality will be devised after consultation with health professionals.*

5. *A retrospective study of records will be undertaken for the inpatient study, to eliminate bias due to change of behavior during the survey. This is not possible for the outpatient study, as detailed patient data are not recorded on a daily basis. A prospective survey method will be used and the staff will as far as possible not be aware of the criteria to be used.*

METHOD OF STUDY

1. GENERAL:

a) The draft protocol will be discussed in full with the Chief Medical Superintendent of King Edward VIII Hospital, the Head and Senior Consultants of the Department. Written authority to conduct the study and for access to patient and other records will be sought. This includes statistics on patient utilization of services, the staff, financial, equipment and other resources available to the paediatric unit. A final protocol will then be drawn up, with modifications where necessary.

b) A committee consisting of the researcher, senior consultants of the paediatric department and the medical superintendent responsible for the paediatric department will be established. This committee will be responsible for selecting conditions which will be studied in depth in the unit. It will establish criteria for assessing the quality of care given in respect of each selected condition, with particular reference to admission and discharge or transfer criteria. The committee will also decide on the most suitable dates for the study period, and will be actively involved in motivating for thorough Departmental and Hospital cooperation in all aspects of the study.

2. OBJECTIVE 1 :

a) MANPOWER : Details of the Departments' staff, for all categories will be gathered from the relevant personnel and departments. Official time allocation to perform duties and undertake responsibilities will be determined from available rosters.

b) ACCOMMODATION, EQUIPMENT AND OTHER MATERIAL RESOURCES : Details of the above resources available to the Department will be gathered from identified personnel and departments. Major items of equipment in stock in the Department will be tabulated (beds, bassinets, cots, incubators, etc.). The administration, workshop and ward records will be used to establish trends in usage and repair of this equipment.

3. OBJECTIVE 2 :

a) UTILIZATION OF SERVICES PROVIDED BY THE DEPARTMENT - OUTPATIENTS.

Purpose : To determine a profile of diseases treated and the number of attendances, admissions, transfers and deaths occurring in the paediatric outpatient department during the study period.

Method The clerical, nursing and medical staff will be fully briefed as to the purpose and method of the study. A daily questionnaire / checklist will be required to be completed by the attending doctor or nurse, following the normal consultation (Appendix 3). A new questionnaire / checklist will be issued daily and the completed list collected for collation and analysis. Information will be gathered on EACH patient attending the Department during the study period. This will consist of the outpatient number, age, sex and race of the patient. The diagnostic details, episode of care for each condition and the outcome of the consultation will also be entered onto the questionnaire / checklist. If the patient is reviewed following treatment or observation during the current visit, this will be indicated on the questionnaire. The conditions will be grouped according to commonly occurring conditions.

The sample for the Survey Of Selected Conditions will be drawn from this questionnaire / checklist. The criteria for including cases (the selected conditions) will be circularized. (See Method 3.c).

The researcher will enter the data onto collation sheets/ microcomputer.

A pilot study will be undertaken over a two day period and any necessary adjustments will be made.

b) UTILIZATION OF SERVICES PROVIDED BY THE DEPARTMENT - INPATIENTS.

Purpose : To determine a profile of diseases treated and the number of discharges and deaths occurring in the paediatric wards for the year 1986 (January to December).

Method : The King Edward VIII Hospitals' computer will be utilized to undertake a search of its data files for the period concerned. The number of discharges and deaths will be totalled per month, and mean length of stay will be calculated. The diagnoses will be grouped according to the Basic Tabulations List of the ICD 9th Edition. The Departments' computer data may also be analyzed for the purposes of comparing the two systems.

c) SURVEY OF SELECTED CONDITIONS - OUTPATIENTS.

The committee will meet to decide on the conditions or diseases which will be assessed. This decision will be based on their perceived importance (prevalence, ward distribution, morbidity, mortality, cost).

The committee will then establish, in respect of each of these conditions, criteria for assessing the quality of care expected at a teaching hospital. These criteria will consist of a protocol of minimum requirements expected of the personnel and department in the taking of a history, examining the patient and performing any other investigation required in order to arrive at a diagnosis. Minimum requirements must be stated for the management of the patient and the prescribing of medications, including aspects which would be considered to be excessive, unwarranted or counter productive. These criteria will also include structural and equipment components of the Department, where relevant. Admission, discharge and transfer criteria will be particularly detailed.

The clerical, nursing and medical staff will be fully briefed as to the purpose and method of the study and the conditions or diseases to be included. These staff members will as far as possible not be aware of the criteria which are to be used in evaluating the management provided. The department will be requested to circularize details of

the study and the committee will assist in motivating for the thorough cooperation of all concerned.

Each staff member involved in the examination / management of patients will be issued with a list detailing those cases which are to be included in the study. The identifying hospital numbers of these cases will be entered onto the relevant portions of the Utilization questionnaire / checklist, in the manner described above (Method 3.a).

Selection of Sample : The outpatient number of all patients who have the specified condition who are seen in department will be listed in numerical order. Every second case will be included in the study.

The researcher will draw the hospital records of this selected sample and analysis will be undertaken (by comparison of each record with the established criteria). Any deaths will be discussed by the committee in full.

A pilot study will be conducted to assess the validity of the method and the criteria used. Cases for this pilot study will be selected from patients presenting who fulfil the inclusion criteria. Any necessary amendments will be made to the final study.

The study period will be one week (or as determined by the committee).

d) SURVEY OF SELECTED CONDITIONS - INPATIENTS

A similar procedure will be undertaken concerning inpatients.

SELECTION OF SAMPLE : The sample will be selected from the 1986 ward records. All patients with the selected conditions admitted during the first 7 days of the months January, April, July and October will be included.

The researcher will draw the hospital records of this selected sample and analysis will be undertaken (by comparison of each record with the established criteria). Any deaths will be discussed by the committee in full.

A pilot survey will also be undertaken. Cases for this pilot study will be selected from patients discharged during the pilot period who fulfil the inclusion criteria. Any necessary amendments will be made to the final study.

4. ***OBJECTIVE 3 :***

ADMINISTRATION AND DEPARTMENTAL RECORDS will be used to ascertain certain measures of output and outcome, such as bed occupancy rates, average length of stay, discharge rates, and death rates for patients in the Department.

5. ***OBJECTIVE 4 :***

The quality of paediatric care will assessed from the above objectives.

6. ***Collation and Analysis.***

The above findings, together with any other data (in keeping with the objectives) which may become available during the study, will be collated and analyzed. These procedures will be part manual and part computerized.

7. *Submission of Findings* : *OBJECTIVE 5 :*

The findings of the study together with recommendations will be submitted in the form of a report to the Chief Medical Superintendent, the Paediatric Department and will later be submitted to the Department of Community Health in partial fulfillment of the requirements for Part II of the MMED(Community Health) degree.

TENTATIVE SCHEDULE OF COMPLETION DATES

1.	*Completion of draft protocol*	*05/12/86*
2.	*Finalization of protocol, after consultation*	*12/12/86*
3.	*Obtaining of written permission*	*23/12/86*
4.	*Establishment of committee*	*31/01/87*
5.	*Selection of conditions and Criteria definition*	*31/03/87*
6.	*Completion of questionnaires/ checklists*	*07/04/87*
7.	*Pilot survey - outpatient utilization*	*15/04/87*
8.	*Pilot survey - outpatient selected conditions*	*15/04/87*
9.	*Pilot survey - inpatient selected conditions*	*15/04/87*
10.	*Collection of data from Department and Administration records - resources, process, output, outcome data*	*30/06/87*
11.	*Outpatient survey period*	*01/05/87 - 30/05/87*
12.	*Collation and Analysis*	*30/07/87*
13.	*Submission of Final report*	*31/10/87*

4 -> As determined by the committee.

APPENDIX 2 CLAIRWOOD HOSPITAL
LENGTH OF STAY, PATIENT ADMISSIONS AND PATIENT DAYS
1986 FOR THE PAEDIATRIC WARDS

WARDS C1, C2 ,C3, C4 (NB ward C2 is a surgical ward.)

Patient Days = 85426 Patient Days for medical wards = 67755

Admissions = 3100 Admissions not known for medical patients alone.

Average Length of Stay = Patient Days / admissions

= 85426 / 3100

= 27.6 days

FEVER WARDS

Patient Days = 24886

Admissions = 3490

Average Length of Stay = Patient Days / Admissions

= 24886 / 3490

= 7.1 days

GIVEN THAT 6 PATIENTS PER DAY ARE ADMITTED DIRECTLY FROM CLAIRWOOD (NOT KING EDWARD)

SCENARIO 1

i) If 5 patients (on average) per day were admitted directly to the general C Wards, these patient would account for 5 X Average Length of Stay X 365 Patient Days in 1986 ie. 5 X 27.6 X 365 = 50370 Patient Days. These are Patient Days generated by Clairwood Hospital. Therefore, the remainder of the total 67755 Patient Days for the C Wards (17385) is in respect of patients admitted from King Edward Hospital.

ii) If, in addition, 1 patient (on average) was admitted directly to the Fever Wards, this would account for 1 X average Length of Stay X 365 Patient Days in 1986 ie. 1 X 7.1 X 365 = 2592 Patient Days. Therefore, the remainder of the 24886 Patient Days for the Fever Wards (22294) is in respect of patients admitted from King Edward Hospital.

Hence, the total number of Patient Days at Clairwood Hospital which were in respect of patients admitted from King Edward Hospital in 1986 were 17385 + 22294 = 39579.

The Patient Days for the King Edward Hospital wards of N1 and N2 was given as 139374 (which figure includes the stay at Clairwood Hospital. The Patient Days for the 225 beds at King Edward Hospital itself can now be calculated for 1986, by deducting the days spent at Clairwood, as calculated above - ie. 139374 - 39579 = 99795 Patient Days.

The **BED OCCUPANCY RATE (BO)** at King Edward Hospital would therefore be -

$$\text{Bed Occupancy (BO)} = \text{Patient Days} \times 100 \,/\, /\text{No. of Beds} \times 365 \text{ days in year}$$

$$= 99795 \times 100 \,/\, / 224 \times 365$$

$$= 122\ \%$$

SCENARIO 2

Using this method, if less patients were actually admitted directly than this average, the Bed Occupancy for King Edward Hospital decreases (as more of the patient days at Clairwood would be deducted from the total patient days figure supplied for King Edward Hospital. Similarly, any alteration of the numbers admitted between the Fever and general wards at Clairwood Hospital changes the calculations because of the differing length of stay on these wards (for example, if 3 patients per day on average were admitted to the C wards and 3 patients per day on the fever wards, then the Bed Occupancy Rate at King Edward Hospital (according to this method) would be calculated as 104 %).

APPENDIX 3

PAEDIATRIC OUTPATIENT UTILISATION SURVEY

DOCTOR / NURSE : ________________________ DATE : __/__/87 SHEET NUMBER : __________

INSTRUCTIONS: 1. DISEASE / CONDITION - Use F to indicate First Hospital Visit for this particular condition. Use R for Repeat Hospital Visit for this particular condition. Use X for Review for this particular condition DURING THE CURRENT visit.
2. ENTER AS MANY CONDITIONS AS MAY PRESENT, using the SYMBOLS above.

PATIENT NUMBER	SEX		AGE						DISEASE / CONDITION * (Enter F for First hosptial visit for this condition, R for Repeat hospital visit for this condition, X for Review during Current visit)																																								OUTCOME **						
									BEHAVIOURAL			CNS				CVS			E/M	ENT		GIT				GUT			HAEM		INFECT		MAL	MSS	NEONATE		RESPIRATORY					SKIN		TB	OTHER (State)										
	Male	Female	1 Dy	2 Dys to 7 Dys	8 Dys to 27 Dys	28 Dys to 1 Yr	>1 Yr to 4 Yrs	>4 Yrs	Child Abuse	Enuresis	Other	Convulsions	C.P./Dev. Delay	Meningitis	Other	Congenital H.D.	Rheumatic H.D.	Other	Endo. & Meta.	Otitis Media	Other	Gastro Ent. ***	Liver Disease	Parasites	Other	Nephritis	U.T.I.	Other	Anaemia	Other	Measles	Other	Malnutrition ***	Musc. Skeletal	Jaundice	Low Birth Wt.	Asthma	Bronchiolitis	Pneumonia ***	U.R.T.I.	Other	Scabies	Other	Tuberculosis					Review	Discharge	Return	Refer	Transfer	Admit	Died
TOTALS (First)																																																							
(Repeat)																																																							
(Review)																																																							

* CNS = Central Nervous (C.P./DEV. DELAY = Cerebral palsy / Developmental delay) CVS = Cardiovascular E/M = Endocrine & Metabolic GIT = Gastro Intestinal GUT = Genito Urinary HAEM = Haematolgy

INFECT = Measles & Other (Chicken pox, Polio, Diptheria, Whooping cough, Mumps, Rubella, Tetanus) MAL = Protein Energy Malnutrition MSS = Muscular Skeletal

** REVIEW = Review later SAME Visit DISCHARGE = No follow-up RETURN = Follow-up required REFER = Refer within unit TRANSFER = Transfer speciality / hospital ADMIT = Admit KEH. DIED = POPD / On Arrival

*** CONDITIONS INCLUDED IN SECOND STAGE: GASTROENTERITIS = Dehydrating Diarrhoea MALNUTRITION = Under 3rd Centile Mass For Age, or Obvious Clinical Malnutrition PNEUMONIA = Lobar and Bronchopneumonia

APPENDIX 4 COMPLETENESS OF DATA : OUTPATIENT STUDY

The table below depicts the number of attenders during the Outpatient study period (13 - 19 May 1987). The number accounted for in the survey (SURVEY) is compared to the number counted by the normal routine in the Department. The sample thus represents 77.7 % of attenders.

	SURVEY	Perc.	POPD
First / Repeat	1254	75.3	1665
Review cases	625	77.1	811
Unknown	44		
TOTAL	1923	77.7	2476

APPENDIX 5 ACCURACY OF DATA : OUTPATIENT STUDY

The table below shows an analysis of the Selected Conditions which were sampled in the Outpatients Department. The diagnoses of the patients were checked against that which was entered on the Questionnaire. Incorrect marking of the record accounted for much of the discrepancies: 8.3 % of pneumonia cases marked on the Questionnaire were not pneumonia's (majority were provisionally diagnosed prior to X-ray and ware re-entered with the definitive diagnosis on review.

CORRECTION FACTORS			
	INCORRECT	DENOMINATOR	PERC
PNEUMONIA	-30	363	- 8.3
MALNUTRITION	0	363	0
GASTROENTERITIS	-9	363	- 2.5

..... CONTINUED OVERLEAF

The complete breakdown of the Outpatient sample is given in the following table. Overall, 273 of the 364 conditions selected form the questionnaire for inclusion (75.0 %), were actually included in the final analysis.

DISEASES	TOTAL	SURVEY SAMPLE						
		INCLUDED	EXCLUDED					TOTAL
			No Record	Not Found	Wrong Diagnosis	Incorrect Marking	Total	
PNEUMONIA	276	94	3	17		20	40	138
MALNUTRITION	102	33	2	5	1	11	19	52
GASTROENTERITIS	349	142	7	13		12	32	174
			12 (13,6)	35 (38,5)	1 (1,1)	43 (47,2)	91 (100)	
Total	727 [100]	273 (75,0)	91 (25,0)					364 (100) [50,1]

APPENDIX 6 CRITERIA - PNEUMONIA - OUTPATIENTS

A. ADMISSION

1. SHOULD BE ADMITTED
   1. Apnoeic - observed or history only. Cyanosis in air, hypotonic, not feeding
   2. Respiratory rate : 0 - 3 months : > 80 / min
      >3 months - 2 years : > 60 / min
      > 2 years : 40 - 59 / min
      WITH OR WITHOUT recession
   3. Less than 1 month old, and ex - premature birth of < 3 kg.
   4. Effusion, even if small
   5. Cavitation
   6. Other complications, including gastroenteritis, laryngotracheobronchitis(croup), Hb < 9, cardiac failure, significant protein malnutrition, other
   7. If in Group 2 and no improvement after 6 hours

2. SHOULD BE OBSERVED AND TREATMENT STARTED PARENTERALLY - REVIEWS
   if CXR shows 'extensive ' infiltration, with a respiratory rate < 60 and WITH recession and fever

3. OUTPATIENT TREATMENT DE NOVA
   if CXR does not show extensive infiltration, with a respiratory rate < 60 but WITHOUT recession

B. INVESTIGATIONS

1. CXR
2. FBC - only as part of admission procedure
3. Blood culture - only as part of admission procedure
4. Pleural tap - part of admission procedure
5. Blood gases - if deteriorating, if been cyanosed - part of admission procedure

C. IMMUNIZATION - FIRST visit

Immunization Measles > 8 months OR
Measles hyperimmunoglobulin 0.25 ml/kg IMI IN i) 4 to 8 months AND ii) severe kwashiorkor > 8 months

D. ANTIBIOTICS

1. Penicillin parenteral or oral if not too ill. May use Bactrim /erythromycin
2. Sub-optimal response - aminoglycoside ADDED - only as part of admission procedure
3. Early effusion or cavitation - cloxacillin + fucidic acid - only as part of admission procedure

E. TREATMENT - RESPIRATION

1.1 and 1.2 of admission criteria - OXYGEN: enough to abolish cyanosis - prior to formal admission procedure

F. TREATMENT - FLUIDS (for dehydration)

1. PROCEDURE

1. < 5 % dehydration
   ORT solution / Electrolyte / 1/2 D/Darrows.
   Vomiting - N/G tube 15-20 ml/kg/hour.

OR DIRECTLY TO -

2. IVI - Volumes: Correctly ordered

A) Rehydration + Maintenance

First 24 hrs app.		Preterm	60-80 ml/kg/24 hr
		Term	80-100 up to 150
5%	50 mls/kg	<1 yr	120
10%	100 mls/kg	1 -2 yr	100
		2- 4 yr	85

B) SEVERE DEHYDRATION

SHOCK Plasma - if given or not

2. ASSESSMENT

Reassess 2 - 4 hourly in mild to moderate and 1/2 hourly in severe dehydration

G. NURSE MONITORING

Monitor respiration rate, pulse rate, temperature - 2 hourly, in those being observed - recorded

H. DISCHARGE

1. DISCHARGE

1. Clinically well or MARKEDLY improved, temperature stable/normal : 'fit for discharge'
2. NO wheezing, tachypnoea, stridor, recession, 'no distress'

2. Follow up - CXR

1. If reviewed in 3 to 4 days and not markedly improved - CXR
2. If reviewed >= 7 days and not markedly improved or initial CXR 'extensive ' - CXR

APPENDIX 7 CRITERIA - GASTROENTERITIS - OUTPATIENTS

A. ADMISSION

1. Should be admitted after treatment in Paediatric Resuscitation Unit

1. Less than one month of age with dehydrating diarrhoea
2. Infants with malnutrition and dehydrating diarrhoea
3. Dehydrating diarrhoea within one month of previous episode
4. Infants with recurring diarrhoea and weight loss since previous episode
5. Unable to maintain hydration after drip discontinued ie. persistent fluid loss after 18-24 hours
6. FEVER persisting 24 hours after rehydration
7. COMPLICATIONS - convulsions, parenteral infection, circulatory collapse, metabolic (hypernatraemia, hypokalaemia, uraemia, hypo- and hyperglycaemia)
8. Other
9. Should not be admitted if feeding normally, no vomiting, maintaining hydration

B. INVESTIGATIONS

1. Stool mcs or microscopy - must be taken if blood and mucous passed
2. Electrolytes - frequency (on admission if clinically acidotic)
3. Stool reducing substances - excessive in POPD

C. PRU - NURSING MONITORING ROUTINE

1. Weight on admission
2. Temperature, stool, vomiting - episodes recorded
3. Fluids - volumes as prescribed

D. TREATMENT - FLUIDS

1. PROCEDURE

1. < 5 % dehydration
   ORT solution / Electrolyte / 1/2 D/Darrows.
   Vomiting - N/G tube 15-20 ml/kg/hour.

OR DIRECTLY TO -

2. IVI - Volumes: Correctly ordered

A) Rehydration + Maintenance

First 24 hrs app.	
5% 50 mls/kg	Preterm 60-80 ml/kg/24 hr
10% 100 mls/kg	Term 80-100 up to 150
	<1 yr 120
	1 -2 yr 100
	2- 4 yr 85

..... CONT.

B) SEVERE DEHYDRATION
SHOCK Plasma - if given or not

2. ASSESSMENT

Reassess 2 - 4 hourly in mild to moderate and 1/2 hourly in severe dehydration

E. TREATMENT - METABOLIC

1. ALL patients - if potassium supplements given or not
2. KCl if < 2.5 mmol/l add KCl 15% 1 ml/100 mls 1/2 D/D while on drip
3. Severe acidosis: if sodium bicarbonate given or not (Base Deficit 12-15)

F. TREATMENT - ANTIBIOTICS - Part of admission procedure

1. AFTER INVESTIGATIONS initiated (culture - stool, blood, L.P., urine {suprapubic}, other)
[< 1 month, marasmus/kwashiorkor, ill awaiting results (Cotrimoxazole ivi 12hrly X 2 doses. Reassess 12-24 hrs. Sepsis - appropriate, excluded - stop, not excluded - oral cotrimoxazole. Reassess daily. If new signs or > 3 days - ? hospital acquired infection - after cultures cephalosporins {1987})]
Parenteral - cotrimoxazole/penicillin + aminoglycoside
2. Parenteral infection - pneumonia (penicillin), otitis (cotrim), meningitis (pen/chloro). Continue as above.
3. NO ANTIBIOTIC if >1 month old and well nourished, no parenteral infection suspected. INVESTIGATIONS (Culture - stool, urine). Continue as above.

G. IMMUNIZATION

Immunization Measles > 8 months OR
Measles hyperimmunoglobulin 0.25 ml/kg IMI IN i) 4 to 8 months AND ii) severe kwashiorkor > 8 months

H. COMPLICATIONS DURING STAY

1. Medical Officer called
2. Patient should be admitted

1. Circulatory collapse
2. Convulsions: meningitis/encephalitis, metabolic, other, unknown
3. Metabolic: hypernatraemia, hypokalemia, prerenal uraemia,
4. Hypoglycaemia, hyperglycaemia
5. Persistent Diarrhoea and Malnutrition: lactose intolerance, other
6. Other

I. DISCHARGE

1. Criteria
   1. Hydration corrected / maintained, no vomiting
   2. Electrolytes normal, including glucose and urea
2. Follow up
   1. Education given
   2. Arrangements for follow up

APPENDIX 8 CRITERIA - PROTEIN ENERGY MALNUTRITION - OUTPATIENTS

DEFINITION

< 3rd cent mass for age or suspected moderate or severe PEM

A. ADMISSION

1. Failed treatment - no sustained weight gain, no improvement in other features associated with initial presentation
2. Dehydration or dehydrating diarrhoea and vomiting- via PRU
3. Overt infection, including pneumonia
4. Open skin lesions
5. Hypothermia
6. Jaundice
7. Altered level of consciousness
8. Other
9. Not admitted - none of the above

B. INVESTIGATIONS

1. Stool - parasites
2. Haemoglobin / FBC
3. CXR
4. If indicated -
   1. Electrolytes - frequency (on admission if clinically acidotic, minimum daily on IV and as indicated according to assessment)
   2. Dextrostix testing - hypoglycaemia / hypothermia & 2-3 X per week until oral feeds established. Blood glucose according to result.
   3. Blood culture and others where indicated, prior to use of antibiotics

C. IMMUNIZATION

Immunization Measles > 8 months OR
Measles hyperimmunoglobulin 0.25 ml/kg IMI IN i) 4 to 8 months and ii) severe kwashiorkor > 8 months

D. RESUSCITATION

If done, part of admission procedure only.

1. Hypoglycaemia - 50% glucose 2 ml/kg ivi, then 10% in drip
2. Hb < 66% or < 86% PLUS significant infection - whole blood 20 ml/kg]

E. TREATMENT - FLUIDS

1. PROCEDURE

1. < 5 % dehydration
   ORT solution / Electrolyte / 1/2 D/Darrows.
   Vomiting - N/G tube 15-20 ml/kg/hour.

OR DIRECTLY TO -

2. IVI - Volumes: Correctly ordered

A) Rehydration + Maintenance

First 24 hrs approx.		Preterm	60-80 ml/kg/24 hr
		Term	80-100 up to 150
5%	50 mls/kg	<1 yr	120
10%	100 mls/kg	1 -2 yr	100
		2- 4 yr	85

B) SEVERE DEHYDRATION

SHOCK Plasma - if given or not

2. ASSESSMENT

Reassess 2 - 4 hourly in mild to moderate and 1/2 hourly in severe dehydration

F. PRU - NURSE MONITORING ROUTINE

1. Weight on admission
2. Temperature, stool, vomiting - episodes recorded
3. Fluids - volumes as prescribed

G. FEEDING

If given supplement or not.

H. ANTIBIOTICS - only as part of admission procedure AFTER INVESTIGATION

Penicillin + cotrim, or + aminoglycoside if v. ill OR hypothermia, hypoglycaemia, jaundice, necrotic skin lesions - cefotaxime + amikacin

I. SKIN CARE

J.1. FOLLOW UP AND DISCHARGE PREPARATION

1. Arrangements for follow up
2. Continuing advice (diet, intercurrent infection) - recorded

J.2. DISCHARGE CRITERIA

1. Discharge when sustained weight gain, no oedema
2. according to other presenting features

APPENDIX 9 CRITERIA - PNEUMONIA - INPATIENTS

A. ADMISSION

1. SHOULD BE ADMITTED

1. Apnoeic - observed or history only. Cyanosis in air, hypotonic, not feeding
2. Respiratory rate : 0 - 3 months : > 80 / min
   >3 months - 2 years : > 60 / min
   > 2 years : 40 - 59 / min
   WITH OR WITHOUT recession
3. Less than 1 month old, and ex - premature birth of < 3 kg.
4. Effusion, even if small
5. Cavitation
6. Other complications, including gastroenteritis, laryngotracheobronchitis(croup), Hb < 9, cardiac failure, significant protein malnutrition, other
7. No improvement after 6 hours in POPD

B. INVESTIGATIONS

1. CXR
2. FBC
3. Blood culture
4. Effusion - pleural tap; culture if necessary to make diagnosis
5. Mantoux
6. Persistent collapse / emphysema - bronchoscopy
7. Blood gases - if deteriorating, if been cyanosed.

C. IMMUNIZATION

Immunization Measles > 8 months OR
Measles hyperimmunoglobulin 0.25 ml/kg IMI IN i) 4 to 8 months AND ii) severe kwashiorkor > 8 months

D. ANTIBIOTICS

1. Penicillin parenteral or oral if not too ill. May use Bactrim / erythromycin : one antibiotic
2. More than one antibiotic
3. If sensitivities available, and if resistant organism or no response to penicillin, change accordingly
4. Early effusion or cavitation - cloxacillin + fucidic acid

E. TREATMENT - RESPIRATION

1. If cyanotic and if taken for any other reason :

1/2-1 hour after abolish cyanosis do blood gases -

THEN a) O2 alone - normal pCO2 (40-45),pO2 50 in 60% O2- pink
b) CPAP - pCO2 <70, pH <=7.25, pO2 <50 in 60% O2, or apnoea pulmonary oedema
c) Ventilation - Apnoea, pCO2 >70, pO2 <50 on 60% O2, acidosis, shock

AIM pO2 60-90 mm Hg, pCO2 35-45 Hg, pH 7.3-7.45

F. TREATMENT - FLUIDS

1. PROCEDURE

1. < 5 % dehydration
   ORT solution / Electrolyte / 1/2 D/Darrows.
   Vomiting - N/G tube 15-20 ml/kg/hour.

OR DIRECTLY TO -

2. IVI - Volumes: Correctly ordered

A) Rehydration + Maintenance

First 24 hrs app.		Preterm	60-80 ml/kg/24 hr
		Term	80-100 up to 150
5%	50 mls/kg	<1 yr	120
10%	100 mls/kg	1 -2 yr	100
		2- 4 yr	85

B) SEVERE DEHYDRATION

SHOCK Plasma, if given or not

2. ASSESSMENT

Reassess 2 - 4 hourly in mild to moderate and 1/2 hourly in severe dehydration

G. NURSE MONITORING

Monitor respiration rate, pulse rate, temperature - 4 hr routine
More frequently if requested (eg in cases such as LTB, worried - recession, wheeze, hypotonic), - recorded

H. COMPLICATIONS

1. Empyema - CXR & aspiration: antibiotics, drainage accordingly
2. Pneumomediastinum / pneumothorax - noted, action taken accordingly
3. Pulse > 160 / min - digitalization

I. DISCHARGE

1. Home

1. Clinically well or MARKEDLY improved, temperature stable/normal
2. Able to finish antibiotics orally or other arrangements made
3. Effusion MARKEDLY regressed or cleared

2. Clairwood

MUST BE CLINICALLY IMPROVED, but ± parenteral and ± severe pneumonia.

3. Follow up

1. Return for review on ward / clinic / POPD / elsewhere
2. If Chronic
3. If Surgical, review at Thoracic Clinic

APPENDIX 10 CRITERIA - GASTROENTERITIS - INPATIENTS

A. ADMISSION

1. Should be admitted VIA PRU

1. Less than one month of age with dehydrating diarrhoea
2. Infants with marasmus / kwashiorkor and dehydrating diarrhoea
3. Dehydrating diarrhoea within one month of previous episode
4. Infants with recurring diarrhoea and weight loss since previous episode
5. Unable to maintain hydration after drip discontinued ie. persistent fluid loss after 18-24 hours
6. FEVER persisting 24 hours after rehydration
7. COMPLICATIONS - convulsions, parenteral infection, circulatory collapse, metabolic (hypernatraemia, hypokalaemia, uraemia, hypo- and hyperglycaemia)
8. Other
9. Should not be admitted if feeding normally, no vomiting, maintaining hydration

B. INVESTIGATIONS

1. Stool mcs
2. Electrolytes - frequency (on admission if clinically acidotic, minimum daily on IV and as indicated according to assessment)
3. FBC
4. Mantoux (< 3/12 not priority here ie. if > 3/12)
5. Stool reducing substances after day 3 if persisting diarrhoea

C. NURSE MONITORING ROUTINE

1. Weight on admission
2. Stool, vomiting - episodes recorded
3. Intake chart & Fluids - volumes as prescribed

D. TREATMENT - FLUIDS

1. PROCEDURE

1. < 5 % dehydration
   ORT solution / Electrolyte / 1/2 D/Darrows.
   Vomiting - N/G tube 15-20 ml/kg/hour.

OR DIRECTLY TO -

2. IVI - Volumes: Correctly ordered

A) Rehydration + Maintenance

First 24 hrs app.		Preterm	60-80 ml/kg/24 hr
		Term	80-100 up to 150
5%	50 mls/kg	<1 yr	120
10%	100 mls/kg	1 -2 yr	100
		2- 4 yr	85

B) SEVERE DEHYDRATION

SHOCK Plasma, if given or not

2. ASSESSMENT

Reassess 2 - 4 hourly in mild to moderate and 1/2 hourly in severe dehydration

E. TREATMENT - METABOLIC

1. ALL patients - potassium supplementation - given or not
2. KCl if < 2.5 mmol/l add KCl 15% 1 ml/100 mls 1/2 D/D while on drip
3. Severe acidosis: If sodium bicarbonate given or not (Base Deficit 12-15)

F. TREATMENT - ANTIBIOTICS

1. AFTER INVESTIGATIONS initiated (culture - stool, blood, L.P., urine {suprapubic}, other)
   [< 1 month, marasmus/kwashiorkor, ill awaiting results (Cotrimoxazole IVI 12hrly X 2 doses. Reassess 12-24 hrs. Sepsis - appropriate, excluded - stop, not excluded - oral cotrimoxazole. Reassess daily. If new signs or > 3 days - ? hospital acquired infection - after cultures cephalosporins {1987})]
   Parenteral - cotrimoxazole/penicillin + aminoglycoside
2. Parenteral infection - pneumonia (penicillin), otitis (cotrim), meningitis (pen/chloro). Continue as above.
3. NO ANTIBIOTIC [if >1 month old and well nourished, no parenteral infection suspected. INVESTIGATIONS (Culture - stool, urine). Continue as above]

G. IMMUNIZATION

Immunization Measles > 8 months OR
Measles hyperimmunoglobulin 0.25 ml/kg IMI IN i) 4 to 8 months AND ii) severe kwashiorkor > 8 months

H. DISCHARGE

1. Criteria
   1. Hydration corrected / maintained, no vomiting
   2. Electrolytes normal - in those where electrolytes found to abnormal, as above, or if not measured, in the moderate to severe dehydration where this may have been suspected.
2. Follow up
   1. Education given
   2. Arrangements for follow up

APPENDIX 11 CRITERIA - PROTEIN ENERGY MALNUTRITION - INPATIENTS

DEFINITION

	No Oedema	Oedema
< 3rd cent mass for age	Underweight	Kwashiorkor
< 60% of 50th cent mass for age	Marasmus	M/K.kor

A. ADMISSION

1. Failed treatment - no sustained weight gain, no improvement in other features associated with initial presentation
2. Dehydration or dehydrating diarrhoea and vomiting- via PRU
3. Overt infection, including pneumonia
4. Open skin lesions
5. Hypothermia
6. Jaundice
7. Altered level of consciousness
8. Other

B. INVESTIGATIONS

1. CXR
2. Mantoux
3. Stool - parasites. if over 2 weeks
4. Blood culture and others where indicated
5. Haemoglobin / FBC
6. Electrolytes - frequency (on admission if clinically acidotic, minimum daily on IV and as indicated according to assessment)
7. Dextrostix testing - hypoglycaemia / hypothermia & 2-3 X per week until oral feeds established. Blood glucose according to result.
8. Serum proteins
9. Prothrombin index

C. IMMUNIZATION

Immunization Measles > 8 months OR
Measles hyperimmunoglobulin 0.25 ml/kg IMI IN i) 4 to 8 months and ii) severe kwashiorkor > 8 months

D. RESUSCITATION

1. Hypoglycaemia - 50% glucose 2 ml/kg IVI, then 10% in drip
2. Hb < 66% or < 86% PLUS significant infection - whole blood 20 ml/kg

E. TREATMENT - FLUIDS

1. PROCEDURE

1. < 5 % dehydration
   ORT solution / Electrolyte / 1/2 D/Darrows.
   Vomiting - N/G tube 15-20 ml/kg/hour.

OR DIRECTLY TO -

2. IVI - Volumes: Correctly ordered

A) Rehydration + Maintenance

First 24 hrs app.

5% 50 mls/kg

10% 100 mls/kg

Preterm	60-80 ml/kg/24 hr
Term	80-100 up to 150
<1 yr	120
1 -2 yr	100
2- 4 yr	85

B) SEVERE DEHYDRATION

SHOCK Plasma - if given or not

2. ASSESSMENT

Reassess 2 - 4 hourly in mild to moderate and 1/2 hourly in severe dehydration

F NURSE MONITORING ROUTINE

1. Weight on admission
2. Temperature, stool, vomiting - episodes recorded
3. Fluids - volumes as prescribed

G. FEEDING

1. Planned feeding - any reference to food supplementation, or breast feeding as applicable

2. Multivitamins or any other combinations

H. ANTIBIOTICS

Penicillin + cotrim, or + aminoglycoside if v. ill OR hypothermia,hypoglycaemia, jaundice, necrotic skin lesions - cefotaxime + amikacin - AFTER INVESTIGATION

I. SKIN CARE

J. DISCHARGE

1. BEFORE

1. Arrangements for follow up
2. Ensure mother informed (diet, intercurrent infection) - recorded

2. CRITERIA

1. Clairwood - must be clinically IMPROVING
2. Sustained weight gain, no oedema and clinically improving
3. Temperature normal
4. Absence of diarrhoea, overt infection, and other complications depending on initial presentation

APPENDIX 12 CRITERIA - NEONATAL UNIT - LOW WEIGHT INFANTS - INPATIENTS

Definition Include: Birth weight <2 500 gms AND <28 days old, OR present weight <2 500 gms AND < 28 days

(Priority 1250 - 2499 gms.)

A. ADMISSION

1. SHOULD BE ADMITTED

1. <1,5 kg or born in KEH <2,0kg
2. Failure to feed - <35 wks, ill, poor cheek pads
3. Jaundice - if high bilirubin (see levels below)
4. Anaemia
5. Respiratory distress
6. Hypoglycaemia
7. Hypo / hyperthermia
8. Infection suspected
9. Extensive bruising, cephalohaematoma
10. Other

2. SHOULD NOT BE ADMITTED TO THE NEONATAL UNIT

   If born in KEH and clinically well and weighs 2.0 - 2.5 kg.

B. INVESTIGATIONS

1. Hb - O/A, weekly
2. Bilirubin - O/A, daily,if jaundice. If < 1250 gms, not measured immediately
3. Urea & Elec - O/A if admission criteria apply AND 2-3 X week if on IVI until oral feeds established.
4. Glucose / dextrostix- O/A and 4-6 hrly if admission criteria apply AND 2-3 X week if on IVI until oral fluids established

C. IMMUNIZATION

1. BCG
2. Child of mother HBsAg +ve (identified by Obstetricians) immunoglobulin 0,5 ml/kg within 48 hrs vaccine within 48hrs, repeat 1 and 6 months

D. PHOTOTHERAPY

ALL preterm WITH extensive bruising, cephalohaematoma - phototherapy or phenobarb if not available (3 mg/kg)

E. INTRAVENOUS FLUIDS - indications, type

1. ALL those with asphyxia, RDS, cyanotic or apnoeic episodes, weight <1500 gms, hypothermia, hypoglycaemia,major surgical conditions, intolerance of food, signs of infection, stressed infant of diabetic mother
2. Fluids: Day 1 - 10% dextrose: Day 2> - neonatalyte (ie with Na), or other appropriate (eg plasma, blood)

F. FLUIDS - quantities, monitoring

[Routine, not recorded - & insensible (phototherapy, radiant heater) add 1 - 4 ml/kg/hr (50 - 100 ml/kg/day)
- & loss from lungs with tachypnoea up to 15 ml/kg/day]

1. PROCEDURE

*** **Strict input incl. oral feeds (7 feeds/day)** ***

1. < 5 % dehydration
   Oral Rehydration Therapy solution / Electrolyte / 1/2 D/Darrows.
   Vomiting - N/G tube 15-20 ml/kg/hour.

OR DIRECTLY TO -

2. IVI - Volumes: Correctly ordered

   A) Rehydration + Maintenance

First 24 hrs app.		Preterm	60-80 ml/kg/24 hr
		Term	80-100 up to 150
5%	50 mls/kg	<1 yr	120
10%	100 mls/kg	1 -2 yr	100
		2- 4 yr	85

   B) SEVERE DEHYDRATION

   SHOCK Plasma - if given or not

2. ASSESSMENT - if not taking orals adequately

Reassess 2 - 4 hourly in mild to moderate and 1/2 hourly in severe dehydration / shock

G. NURSE IVI MONITORING

1. Input - fluids recorded
2. Strict output including urine, vomiting

H. RESPIRATORY DISTRESS SYNDROME (respiratory rate >= 60/min
expiratory grunt
cyanosis on air
marked costal and sternal recession
crepitations)

1. ALL - CXR
2. ALL - OXYGEN: not for recession alone - enough to abolish cyanosis: 30-60 % headbox- 100% mask initially in obvious cyanosis - gradual 5% reduction.

.....CONT.

3. If cyanosed or taken for any other reason
(if < 1250 gms, not ventilated and gases not taken immediately)
1/2 - 1 hour after abolish cyanosis do blood gases,
in groups b) and c) below
THEN a) O2 alone - normal pCO2 (40-45),pO2 50 in 60% O2- pink
b) CPAP - pCO2 >70, pH <=7.25, pO2 <50 in 60% O2, or apnoea pulmonary oedema
c) Ventilation - Apnoea, pCO2 >70, pO2 <50 on 60% O2, acidosis, shock
[AIM pO2 60-90 mm Hg, pCO2 35-45 Hg, pH 7.3-7.45]

I. JAUNDICE

1. Immediate investigations
bilirubin, blood groups, Coombs, Hb (FBC <14 gm% in full term & <12 gm% preterm) - if not taken already
2. Phototherapy or phenobarb. Discontinue once sustained fall in unconjugated bilirubin
3. Monitoring - daily: (high levels - 6 hourly - not assessed)
4. Exchange Transfusion

AGE	>2.5KG	1.8-2.5KG	1.3-1.8KG	<1.3KG
DAY1	204	170	153	136
DAY2	255	221	204	187
DAY3	289	255	238	221
DAY4	340	289	255	238
DAY5	340	289	255	238
DAY6	340	306	272	255
DAY7	340	306	289	272

EARLIER if indicated in dehydration, hypoxia, acidosis, hypoglycaemia, hypothermia, sepsis - Consultant decision.

J. INFECTION

1. Positive WR
1. Lumbar Puncture, including asymptomatic
2. If WR positive, 10 day procaine penicillin
2. Suspect infection, including symptomatic + ve WR
FBC(1), WR(2), CSF(4) - WR+mcs, blood culture(8), appropriate swabs(16)
Then start penicillin + aminoglycoside. Check results 48-72 hrs and adjust. If positive cultures, 7-10 days antibiotic course - normal WBC + stable temperature for 3 days - stop. If temperature not settled in 4-5 days, repeat blood culture & WBC - abnormal - change to ? cephalosporin (32).

K. DISCHARGE

1. Criteria
   1. Minimum weight 1.8 kg
   2. Clinically well
   3. Hb - 10 to 12 gm
   4. Urea & electrolyte normal
   5. According to illness, return to normal WCC

2. Follow up
   1. < 1.5 kg birth weight
   2. All who were ill, particularly CNS, Respiratory, positive WR in mother
   3. Blood group incompatibilities
   4. All who had exchange transfusion
   5. Difficulties anticipated with mother and social circumstances

APPENDIX 13 MONITORING QUALITY OF CARE

High quality of care should consist of several major points: a) provide optimum improvement in a patients health at the earliest time possible, with the best interests of the patient in mind; b) emphasize the promotion of health, the prevention of disease or disability and early detection and treatment of such conditions; c) provide care without undue delay, without inappropriate curtailment or unnecessary prolongation; d) seek to gain the informed cooperation and participation of patients in the process and decisions made; e) practice based on accepted priorities and efficient use of appropriate technology and resources; f) exercise sensitivity and concern for the patients' overall welfare; g) be well documented to enable continuity of care and peer review.

The methods used to achieve these goals are varied, for example, individual licencing, certification, and accreditation through continuing education and peer review. But of late the long held view that quality is a matter for the professions themselves alone to decide on, is being challenged: the service users must be the key to the implementation and running of services and in a sense they are the most important evaluators since they are at the receiving end of the care process [48]. Mechanisms for assessing patients' viewpoints are therefore also being developed.

GUIDELINES:

1) *To enable assessment of the quality of care, criteria will need to be developed with which the various professions agree, in order to make them acceptable and relevant.*
2) *While any of the three basic elements of structure, process and outcome may be used, preference should be given to measures which link all three. This will assist in the continuing education of those in practice.*
3) *In order to establish the effects of the variables comprising the structures and processes, retrospective and prospective methods need to be used.*
4) *It is difficult to assess final outcome in most cases, since it is long term and other factors may obscure the results over time. Therefore, measures to evaluate intermediate results will also need to be utilized.*

..... CONTINUED

5) *Review of all aspects of medical care is neither practical nor necessary: specific target areas such as different specialties, diagnoses, services or providers, sampling techniques or a combination of the above would suffice. The specific aspects chosen could vary with time and place depending on the goals set.*

6) *The techniques involved should be both the highly structured (such as the review of laboratory results which has no dependance on evaluator judgement) and the more implicit techniques (with little structure and requiring evaluator judgement) since they will measure different aspects of quality. The explicit methods are more readily accepted because of their ability to be consistent and objective, but the implicit allows account to be made for the unique features of each case.*

7) *Peer review may take 3 forms: before the service is given (but not to be implemented in a manner which would decrease the quality of care); concurrent (access to expert opinion during the course of consultations via electronic and other media and conventional second opinions); and thirdly, retrospectively with emphasis on patient outcomes. When fully implemented this would allow the early identification and correction of care deficiencies.*

8) *All quality assessment programmes should be structured to enable improvements in care to be implemented (through communication, education programmes and other mechanisms to modify behavior).*

9) *The programme itself must be continually evaluated and modified as necessary.*

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