

ASSESSMENT OF THE EFFECTIVENESS OF  
A CONTINUING EDUCATION PROGRAMME  
FOR PEDIATRIC NURSES IN NIGERIA

By



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## ABSTRACT

In any given health care system where the incidence of disease is high and the outcome poor, the process of care should be examined to determine changes that can be made, which will lead to improved outcome. The hypothesis to be tested in this study is that carefully designed and administered continuing education programme for nurses will improve the process of care and improve the outcome in critically ill children who have been hospitalized because of measles, meningitis or tetanus. In other words, improved nursing education improves quality of care. This thesis presents a randomized controlled trial to test the hypotheses.

Issues in quality of care and quality assurance are discussed. An in-service education programme is developed for nurses who have no pediatric special care training but, because of shortage of medical personnel, are depended upon heavily to make judgements about care of critically ill infants.

This educational programme is based on pathophysiological states which are designated indicator conditions. The quality of care studies done before and after the educational programme are based on nurses' management of infants with these indicator conditions. The use of pathophysiological states rather than specific diseases allows

for a greater number of pediatric patients to be managed by nurses who have this in-service training since most of the infants admitted into the hospitals develop one or any combinations of these morbid states.

A general hospital setting is chosen for this study for greater generalizability of the results since most of these infants are cared for in general hospitals; only a negligible number compared to the high incidence are admitted into teaching hospitals.

To reiterate: the main questions that this thesis seeks to answer are:

1. Did the nurses learn?
2. Did they change their practice behaviour?
3. If (1) and (2) had occurred, did the patients' health outcome change?

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## CHAPTER I

### INTRODUCTION

While quality assurance has become the concern of both the consumers and providers of care in North America, it has not yet been recognized in Nigeria as an essential aspect of health care delivery. The individual practitioner has the responsibility of assessing the care he gives based on his own standards and judgement. There are no organized programmes designed to determine to what extent specified values in patient care achieve pre-determined standards of care. In Nigeria many nurses and physicians practice in an "expanded role", especially in the rural areas where resources are low and health professionals are few. It becomes even more necessary in such a situation that the care provided by these professionals should be assessed in terms of pre-determined standards and any deficiencies exposed corrected by an appropriate method, to enable them to cope effectively with this responsibility.

What is quality assurance all about? It is a "term used to describe a process in which standards are set and action is taken to ensure achievement of the standards. This process involves the description of the level of quality desired and feasible, and a system for ensuring its achievement." It has come to stay as an

adaptive change necessary for the survival of health care practice. This change cannot be regarded any more as planned solely by health care professionals because the current demand for quality assurance in North America originated from the public sector. In 1972 United States Social Security Amendment Act demanded that professionals and health delivery agencies organize and implement effective quality control methods by 1976 (69). There has been an overwhelming response since then by health professionals to assess and improve the quality of care they provide.

The major approaches to studying quality of care are the studies of:

- (i) Structure (human and physical facilities)
- (ii) Process (evaluation of the performance of health professionals in the management of the patient)
- (iii) Outcome (the patient health status resulting from the performance of health professionals)

Whatever the approach adopted, the purpose of evaluating care should be to correct deficiencies where they exist, and then assess the effect of the corrective action taken.

The final objective in quality of care assessment is the patient health outcome. The growing awareness of this has led to many attempts in recent studies to relate performance to health

2.3 If nurse behaviour (process) changed, did it affect patient outcome?

The methodological issues involved in the three approaches to quality of care studies are discussed. The impact of continuing medical and nursing education on patient care in the light of current literature is also discussed. These review chapters provide the background to the major component of this thesis. A study design is proposed for examining the effect of continuing nursing education in the management of infants who require special care in Nigerian hospitals.

## CHAPTER 2

### REVIEW OF LITERATURE

#### 2.1 CHANGING CONCEPTS OF NURSING

##### 2.1.1 Background

For many years nursing practice was based on patterns established by early nurses such as Florence Nightingale and Clara Barton (61). Nurses were chiefly concerned with procedures aimed at providing an environment of comfort, cleanliness and safety. The physician diagnosed diseases, single-handedly, directed both patient and nurse in what to do and how to do it. Nurses followed instructions given by physicians and exercised little independent judgement (61). But times change, health requirements change and so do health professionals.

As health care has grown increasingly complex, nursing has moved from being a technology to being a full fledged allied health profession. As health professionals, nurses are called upon to assess evidence, apply scientific principles to interpret and integrate evidence and make decisions. With this increased professionalization the capacity for critical informed judgement based on careful search for, and evaluation of evidence has become an

important skill for nurses. It is needed in assessment (identifying needs), for intervention (ministering to needs) and evaluation (validating the effectiveness of the intervention). A problem-solving approach is the current method adopted in nursing (41).

#### 2.1.2 In Nigeria

In most English speaking areas of developing African countries, organized health services began only at the turn of the century (68). The advent of missionaries toward the end of the 19-th century revolutionized the practices and beliefs about health problems. These colonial, Christian, slave-trading and exploring groups then provided the forerunners of the present medical and health services (2).

At first, doctors were trained in overseas institutions. Because of the high cost of training involved, the number of doctors produced was very few. No attention was given to the training of nurses. Any training that the young men and women employed to provide nursing services might have received was purely incidental (68). The confidence of the people in the new type of health care grew gradually. More hospitals and clinics were built. This created increasing demand for nurses and doctors.

Better living conditions in the urban areas of Nigeria have attracted doctors and other health care providers to the cities.

Urban centres have more and better equipped hospitals. Consequently, people who live in the cities enjoy better health services while rural dwellers are usually deprived of the health services. The number of physicians is grossly inadequate. Nurses are called upon to take a leading role in staffing rural areas. Nurses working in these areas are trained to use greater independent judgement in delivering health care to the people. Shortage of health care providers is a problem, even in the urban centres where medical and health services are better than in the rural areas. Nigeria has a population of over 60,000,000 people with only 3,112 physicians, 42,000 nurses and midwives to provide health care. The physician/patient ratio is about 1:20000. The population spread over a land space of 350,000 square miles (13). Transportation is poor. Physicians, especially specialists, are concentrated in urban areas. Thus, in many areas nurses, by default if nothing else, assume a major responsibility for decision regarding patient care.

The educational programme proposed in this thesis will be designed to upgrade and to teach skills needed by nurses for this role, in one such situation where nursery care plays a major role in patient care.

## 2.2 QUALITY OF CARE ASSESSMENT

Quality of care assessment may be based on the examination of

structure, process and outcome. These concepts were originally applied in the field of education by Tyler (81) and were adapted later to the area of health care by Donebedian (19).

#### 2.2.1 Methods of Assessment

##### Structure

Without adequate facilities and supplies the quality of care that can be delivered is compromised. For example, a hospital without an operating room facility cannot be expected to perform major surgery which has the same outcome as a hospital with a fully equipped modern operating room suite and intensive care unit. For these reasons some researchers evaluate quality of care by examining structure, the conditions under which care takes place. This approach consists of the assessment of the presence, stability and size of the facility, qualifications of staff members, their experience and the number of personnel. Goldman and Graham's (32) evaluation of the layout and physical facilities of hospitals, number and category of medical personnel is an example of the use of 'Structure Variables' to assess health care delivery. Unfortunately, although key structural variables may provide the necessary conditions for good health care delivery, their presence does not provide sufficient information that good health care is delivered, since it does not directly reflect the care given to specific patients (32).

## Process

Process studies evaluate how health care resources are used. They focus on the activities and behaviours of health professionals. The assumption underlying process studies is that if all the proper things are done, good patient outcome will follow.

Implicit or explicit criteria by which management can be judged are used for evaluation studies that utilize this model. Implicit criteria are process criteria that are based on the judgement of a physician who reviews the process indicators. No prior standard is set (64). In the explicit criteria approach, the standard used for evaluation is specified before review (64).

Early process studies tended to use implicit criteria to assess care (22,48,55,59). This type of criteria is very subjective. Performance may be assumed without appropriate documentation. Thus, the procedure is subject to considerable observer error. Brook (7) showed that among 296 patients with urinary tract infection, hypertension or peptic ulcer, care was considered adequate in 23% on the basis of implicit process criteria whereas only about 2% were considered to have had adequate care when explicit process criteria were applied.

More evaluation studies are using explicit criteria (8,33,41). Because they are specified and objective, fewer value judgements by

the reviewers are needed to estimate quality of care, e.g. when using chart review methods. All the reviewer is asked to judge is whether the information provides evidence that the process item is present or absent. A later tally of the number of process items present is used to evaluate the adequacy of the record.

Three evaluating studies on expanded role for nurses used explicit criteria. For example, Sibley used the process approach to evaluate the clinical care provided by physicians and nurse practitioners. Explicit criteria were developed for clinical judgement of the indicator conditions and the drugs studied (79). The use of explicit criteria enabled nurse abstractors reviewing the physicians' records to obtain a high degree of consistency and high inter-observer agreement about the information on care provided.

There are many methodological issues involved in the development of valid explicit process criteria, (See Section 6.1). Even when acceptable lists of process items are produced, all the process items documented for patient care are not always carried out by health professionals. A study conducted by Hare and Barnoon found that physicians did not follow their own criteria (33). There was no correlation between written criteria and actual performance. Of concern is whether health professionals completely record the procedure they actually carried out. Since the main source of data in process assessment is the patients' records, incomplete recording

may result in no correlation in studies examining the association between theoretical criteria and actual performance even when an association exists. An example of this is the study of physician criteria conducted by the American Academy of Pediatricians Joint Committee on Quality Assurance (64). While a high level of agreement was obtained regarding the appropriateness of the criteria for management, adherence to these criteria could not be documented. The physicians studied did not regard their records as reflecting a quality of care they gave since their performance was not consistently documented.

Studies done on nursing processes usually examine care given by the nurse or care received by the patient (6). Nurses' competencies are measured against a set of standards such as the Slater Nursing Competencies Rating Scale which are not disease-specific studies of care (30). Process of care should not be limited to physiologic and functional measures. Health care involves both a curing and caring function. Quality of care involves both the quality of technical care (adequacy of the diagnostic and therapeutic process), and the art of care (the milieu, manner, and behaviour of the health professional in delivering care and communicating with the patient (8). Health education profession, including nursing, includes education in the biological sciences, technical training in the application of the basic sciences to patient care, thereby ensuring a concerned holistic and scientific

approach to nursing practice.

Sibley developed a new approach to the indicator conditions assessment method that offers several advantages over previously developed methods (79).

#### Outcome

The studies that examine the outcome of care are concerned with measured change in the patients' health status. The outcomes most commonly used include mortality, disability, length of hospital care, morbidity and complications of disease or treatment (86).

Outcome variables are usually established by retrospective examination of patients' charts or by interviewing patients to establish functional levels. Adequate definition of health requires that outcome measures not be confined to physiologic and physical functional status but also include psychologic and psychosocial measures such as patients' perception of health and satisfaction with care (30).

Satisfaction with humaneness of care has been observed to be one of the most important correlates of the behavioural outcomes (85). If the art of care received by the patient from a health professional is good, there is increased willingness to discuss sensitive problems, comply with therapeutic regimen and keep out-patient appointments. These behavioural changes in the patient may lead to improved

functional health outcomes for the patients (8).

Although many researchers argue that outcome is the most accurate index of quality of care, this approach is not without problems. If care is assessed by outcome measures, favourable outcomes are assumed to result from good process of care while unfavourable outcomes are assumed to relate to poor process of care. These assumptions have rarely been verified empirically by the demonstration of specific linkages between process and outcome (30,35).

Another problem presented by the outcome model of quality assessment is that the effect of confounding factors such as disease severity, patients' behaviour, prior health status and misdiagnosis are not always examined (63). In addition, large sample sizes are not used to provide acceptable levels of confidence in the accuracy of the results.

#### 2.2.2 Is Process related to Outcome?

In recent years quality of care studies have tried to establish a link between process and outcome variables. It is argued that if the two are used together, the latter will justify the inclusion of the former (76). It is currently accepted that this approach presents the most comprehensive method of assessing quality of care.

Although many studies have utilized both process and outcome

measures, the question is still being asked, can a link be established (7,30,35,38,45,51,52,83)? Brook (7) studied the process of care in patients with hypertension, urinary tract infection and peptic ulcer in relation to ~~their~~ health outcome using minimal process standards. He found no link between these two variables. McAuliffe (56) discusses fully the issues of analysis, insensitive and inappropriate outcome measures and inadequate statistical controls in these studies. These difficulties might account for the weak correlations between process and outcome variables.

Fessel and Van Brunt (25) failed to find correlation between process and outcome. There were three studies carried out by this group. The first one sought to determine whether recording a greater number of signs and symptoms (process) led to more accurate diagnosis of appendicitis (outcome). Explicit process criteria were not set on the basis of which were the most important and reasonable as shown by clinical trial, or as documented in medical textbooks or as accepted as conventional wisdom. Rather, the criteria were constructed from "recorded symptoms, signs and laboratory data" obtained from one hospital. This approach to criteria development is questionable. The hospital from which the data for criteria assessment were collected had a full complement of staff. This was not the case in the other hospitals to which the criteria were applied. This method for developing criteria is likely to result in differences in adherence to the criteria between the hospitals but may not reflect

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inequality in performance. Their second study was carried out on 50 patients with myocardial infarction who had been discharged. Outcomes measured were post-hospitalization events (time returning to work, new angina, new congestive heart failure, new infarction and death), and were obtained from out-patient records. Audit scores of the 50 patients who survived were compared with 50 who had died. No relationship between process and outcome measures was observed. Attention was not paid to prognostic factors so no appropriate adjustment for initial disease severity was made. In these two studies, bad methodology and analysis probably masked any relationship that might have existed.

Quality of care studies in nursing have also attempted to relate process to outcome. Jacox (38), Kramer (45) et al and Verhonick (82) studied relationships between technical nursing process and patient outcome, while Lindeman and VanAernam (52) studied relationship between art of care and patient outcomes. Given (30) combined the two approaches. In this study of hypertensive patients, the process variables selected were: (1) diagnosis resulting from comprehensive work-up of patients, (2) comprehensive prescription of therapeutic regimen, (3) provision of continuity and follow-up care. These process variables were related to four outcome variables: (1) discomfort, (2) compliance, (3) end organ involvement and (4) patients' perception of health and care received. Comprehensiveness of the diagnostic and therapeutic processes were

found to be significantly related to patients' clinical state and also to the patients' knowledge and perceptions of their disease. This study suggests combining technology of care with the art of care can promote compliance in the patients that leads to improved outcome.

Nobrega (63) also studied patients with hypertension. The process and outcome items were evaluated separately and their relationships compared. Patients whose charts contained good adherence to process criteria were not the same patients that had good outcome, and the reverse was not the case either. Variation in the range of the outcome (blood pressure reading) was small. Few (11% of the 130 patients studied) had outcome diastolic pressure >100. The method of selecting the sample for this study raises the possibility of 'Neyman' bias. A health record analyst selected the patients for follow-up. One wonders what happened to those who might have had fatal outcomes before re-evaluation. This might have accounted for small variation in outcome blood pressure. There is also no documentation in the analysis of the data that they controlled for the initial status of the patients.

The evidence for a link between process of care and outcome remains tenuous. It can only be assessed well if future research pays more attention to methodological issues such as establishing comprehensive, sensitive process items and appropriate outcome

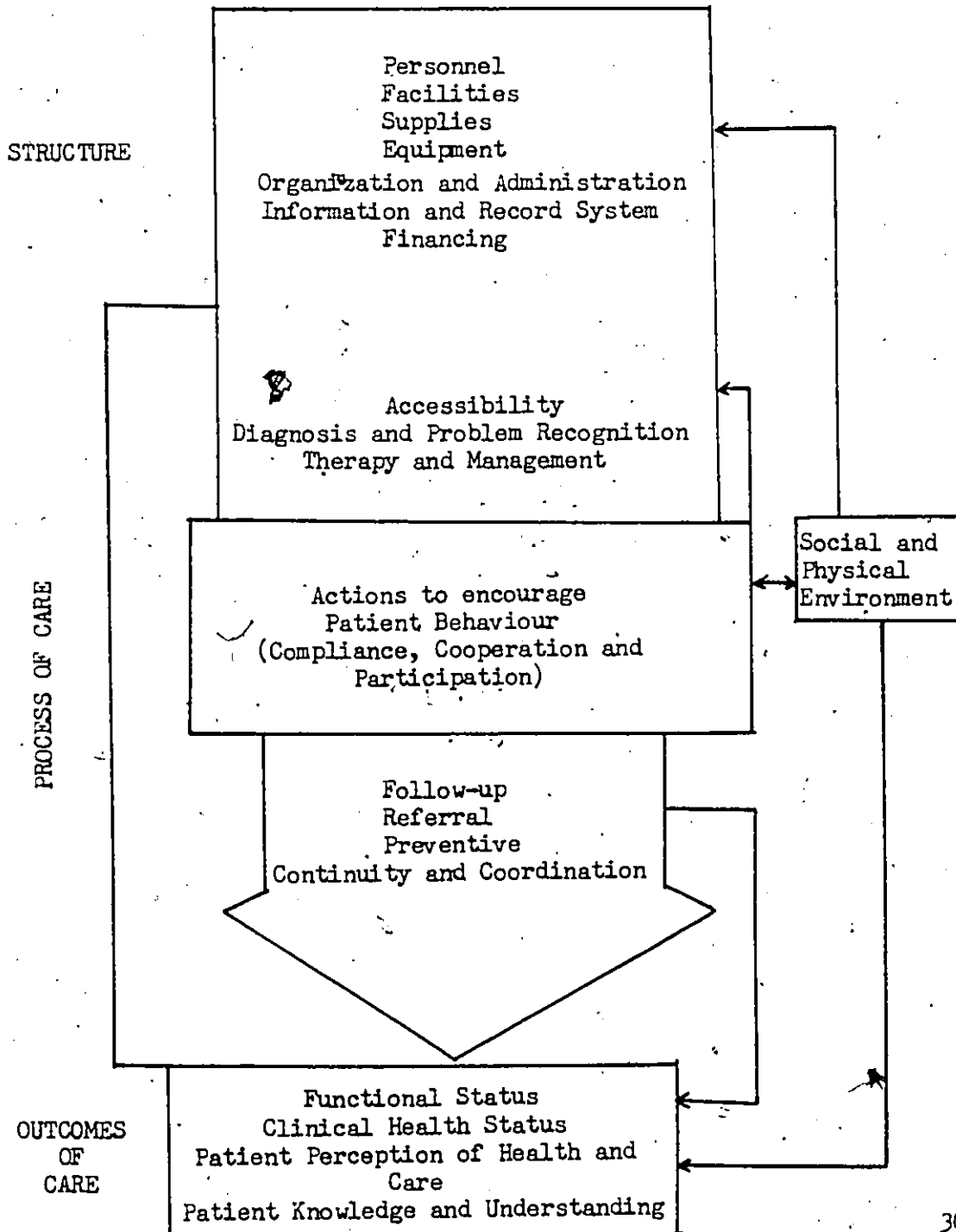
variables; complete and accurate documentation of procedures executed, controlling for confounding factors such as disease severity. For some diseases, more emphasis on the measurement of the art of care and its effect may be needed than is being done now. The control of health problems such as hypertension, ischaemic heart disease, obesity to name only some of the health problems in modern societies, may depend more on improving the art of care than the application of technical procedures.

Although so far little evidence is advanced in support of relationship of process with outcome, previous studies have not examined the effect of changing process in disease states where the outcomes of health care were very poor and large improvements in outcomes are potentially achievable. This is the case in the diseases to be studied in this thesis.

### 2.2.3 Can Nurse-specific interventions influence outcome?

The preceding section highlights the difficulties in establishing links between process and outcome. In medicine, only tenuous links have been established between physician behaviour and health care outcome. Other than the methodological issues discussed earlier, availability of supplies, accessibility to hospital care and the role played by other members of the health care team, to name only a few, also may influence outcome.

## CONCEPT OF HEALTH CARE DELIVERY SYSTEM



In examining nursing care the link between process and outcome may be even more tenuous because nurses do not work in isolation and do not have ultimate responsibility for the patient. The point of this thesis is not to examine nursing-specific health outcome but to look at the effect improved nursing can have on the overall clinical health status.

The nurse is the one member of the health team that spends the greatest amount of time with the patient. The patient's first encounter is usually with the nurse and if an emergency decision is needed about care, she usually takes the first step towards providing the care needed. Poor nursing care is, therefore, likely to be associated with poor outcome. Because of the reality of the existing nursing practice and the health service system, good or improved nursing may not be reflected in improved outcomes. Greater weight will be placed on the process of care changes after the education manoeuvre.

The conceptual framework on which process criteria in nursing will be developed is found in the distinguishing functions for which nursing can be held accountable (61). These functions are inherent in the evolving definitions of nursing practice. Existing definitions appear to agree that the major domain of nursing functions and goals are fulfilled through observing, reporting, recording the response of the patient to his internal and external environment. Through the nursing process the nurse is constantly making judgements about care

and assessing the evidence of care given to the patient (61). Nurses' functions overlap with those of other professional groups as they intervene to construct and arrange environmental conditions so that improved outcomes may result.

This thesis will be developed based on the assumption that if nurses carry out their functions of observation, communication, intervention and judgement about care well improved outcome will occur in at least some of the patients. In the design of the study, other factors in the setting will not be controlled during measurement periods. The process criteria used for the evaluation will be items with the scope of nursing practice that meet the methodologic specifications discussed in Section 6.1.

### 2.3 CONTINUING MEDICAL EDUCATION IN QUALITY OF CARE

Medical educators have acknowledged that the process of education must continue beyond graduation from medical school (65). Over the past 25 years, especially since the advent of mandatory continuing education in some jurisdictions, there had been an enormous increase in the number of continuing education courses offered (3). The impact of continuing education is considerable when measured in terms of the number of health professionals that participate in various forms of programmes and the time and the money spent on courses (17). However, its effectiveness in improving

quality of care is still very debatable (1,4,9,53). Theoretically, continuing education exposes health care givers to new knowledge, increases knowledge, changes their behaviour and ultimately produces more favourable outcomes in the patients' health status. This rationale has been used by increasing number of professional bodies which have made post graduate continuing education mandatory (9).

Williamson (87) was the first to develop an approach that links continuing education directly to patient care. His 1967 study was designed to examine the responses to physicians to abnormal laboratory test results recorded in patients' charts on admission. The charts were examined for evidence that the abnormality was expected by the physician as a result of previous history or findings during work-up in the present admission. If such evidence was found, the test result was assigned to the "expected" category. Where there was no evidence that the physician had expected an abnormal result, the results were categorized as "unexpected". Using the second category of abnormal laboratory findings, patients' charts were reviewed to see whether the physician responded to them. The first assessment showed the physicians responded to only 16 of the 46 unexpected abnormal laboratory results. An educational intervention related to this problem was instituted. Following this intervention, charts were again reviewed. This review showed 18 responses to 40 unexpected abnormal results - no difference from pre-intervention assessment result. The educational intervention was reinforced and

the impact was assessed again. This time 36 responses to 39 unexpected abnormal results were observed. This clinically significant improvement was probably seen only because new internists who had joined the hospital staff in the six months prior to the last assessment were likely to respond to abnormal findings. Other doctors continued to respond to abnormal laboratory findings at a low rate. A further attempt was made to make the physicians respond to these abnormal test results. The laboratory results were covered with florescent tapes to be removed only by the physicians. This intervention lasted 10 weeks. An examination of new patient charts showed a significant change in response (78% responses) to unexpected laboratory findings. Six months later the rate of response was still significantly better than before use of tapes.

This study, though pre-experimental with all the shortcomings (e.g. lack of control group, the untested reliability of data abstraction) that threaten internal validity suggested that continuing education has a place in patient care if educational efforts are directed to the most important determinants of the deficiency observed.

### 2.3.1 Continuing Education and Knowledge Gain

Continuing education is assumed to remedy deficiencies in knowledge. With new or increased knowledge changes in behaviour are assumed to occur, which positively affects patient care and outcome.

Thus, to examine the effect of a continuing education programme, one must be able to show that knowledge gain has occurred. Several studies have focused on knowledge gain as a measure of the effectiveness of continuing education.

Studies have attempted to assess gain in knowledge using various measurement techniques. The most common method of assessing knowledge gain is to compare pre and post intervention scores on paper and pencil tests using multiple choice question type test items. Knowledge gain can only be assessed if a deficiency exists and the programme is tailored to overcome that deficiency (54,62).

Many studies which report knowledge gain after continuing education activity simply use a pre post-test design (20,21,62,71). Participants in the course increase their score on a multiple choice type test of knowledge on second administration. As Donegan (20) et al pointed out, an increase in a post-test score may reflect greater test-wiseness and practice in taking the examination and not reflect knowledge gain. They found post-test scores of three groups of anesthesiologists (only one of whom was exposed to the educational workshop evaluation) increased with repeated test administration. They suggest that comparison groups must be used to evaluate the effect of an educational programme if a causal argument is to be made. To evaluate whether a continuing education programme increases knowledge, knowledge level before the programme must be measured

(pre-test) and knowledge after the programme must be assessed (post-test) and compared to a group of non participants. Without assessment of prior knowledge the impact of the programme cannot be ascertained. To rule out self selection effects, participation status should be randomly assigned. Further, the measures used must reflect the content of the programme (have content validity) and be reliable. Of the 29 continuing education programmes offered to increase knowledge, Bertram (5) et al in their review of literature showed that no one study satisfied the above conditions.

### 2.3.2 Continuing Education and Behaviour Change

Increased knowledge is not necessarily followed by change in practice behaviour (87). But some studies have demonstrated change of behaviour can follow organized continuing medical education. Imui (37) et al studied the impact of physician education on management of hypertensive patients in an out-patient medical clinic. A single tutorial session regarding hypertension and its therapy, compliance problem in the medical care of patients with hypertension, feedback regarding the high level of medical clinic patients with uncontrolled blood pressure and strategies for detecting non compliance and for improving blood pressure was used as the educational intervention. Rather than randomly assigning clinic physicians to the educational manoeuvre, study physicians were arbitrarily assigned to the educational treatment group or the

comparison groups, depending on the days of the week they attended the clinic. All study physicians completed a brief questionnaire which asked for demographic information, knowledge regarding the treatment of hypertension, estimates of compliance levels, influence of previous education on practice and their own practice behaviour in August (before) and in January (after) the educational manoeuvre. Chart audit at these two time intervals was also used to monitor physician behaviour. Additionally, patients were interviewed twice and had repeated independent blood pressure readings taken. At post-test, physicians exposed to the educational manoeuvre were more likely to indicate that their thinking regarding the management of hypertension had been influenced by a recent educational experience, presumably the intervention. They were more accurate in their estimates of their patients' blood pressure control and more skeptical regarding compliance among clinic hypertensive patients than the comparison physicians. Attrition of physicians from the study was higher in the comparison group 18% (6 of 33) than 10% (3 of 29) in the experimental group. While percentage of adequately controlled hypertensive patients of the study physician did not differ from controls in the pre manoeuvre period, significant differences were found in the period immediately following the manoeuvre and were observed among their patients six months after the educational intervention. However, some of this difference appears to be due to a change in the control group (with a decrease in the percentage of

adequately controlled hypertensives) that is larger than the improvement in the experimental group, and only a small cohort of patients were assessed at all three time intervals as the patient population had changed from one measurement point to another. This study, despite its imperfections, provides the best evidence that an educational manoeuvre alters physician behaviour and an intermediate patient outcome (blood pressure control).

In Rubenstein's (73) study, changes in the use of hospital laboratory procedures are used to monitor the impact of continuing medical education programme for physician members of the hospital staff. The educational programme advocated well-established concepts or methods which may have been under-utilized, condemned outmoded practices and exposed the staff to relatively new concepts and methods of laboratory utilization. Change was monitored for a 12-month period prior to and after the presentation of educational material pertinent to the laboratory indicators. Mean utilization during the two periods was compared and the data were subjected to trend analysis. An increase (or decrease) in utilization was noted for each indicator chosen as would be predicted if the educational programme altered physician behaviour. This study suffers from the lack of comparison or control group to rule out the possibility that other uncontrolled factors influenced the change in laboratory service utilization. The number of doctors involved in the programme and description of their characteristics is not given. The

generalizability of the findings makes this difficult to ascertain. However, the changes annotated are impressive in the sense that they consistently occurred in the direction predicted if the educational manoeuvre had an effect.

Laxdal (46) studied the effect of educational programme on the prescribing accuracy of physicians. The independent variable was an educational programme that focused on the common prescribing problems of physicians. The dependent variable was problem frequency in prescribing. The educational intervention aimed at reducing problem frequency. The educational programme focused on deficiencies identified by chart review using explicit criteria. Expert physicians identified significant prescribing problems. Problem frequencies were determined before the intervention and after at 3, 6 and 12 months. Fifteen physicians at three rural hospitals constituted the treatment group while seventeen physicians at two similar hospitals served as controls. However, method of selection of physicians into study and control groups is not defined. Also, other than hospital size, there is no documentation as to their comparability. Laxdal (46) found that the overall problem in the three hospitals was reduced by 62.7% in the study hospital and by 32.0% in the control hospital. An impressive improvement occurred in all the study hospitals at all three measurement periods; in one of the hospitals the problem frequency stayed reduced and even 12 months after the educational intervention. The non-random assignment of physicians to treatment and control groups

which would have controlled for individual differences, and the lack of consideration of other factors in the hospitals that might have influenced the practice of the physicians limit the confidence that can be placed in the data.

The studies reviewed suggest that continuing education can change the practice behaviour of health professionals. Well-controlled randomized studies are needed that carefully handle internal and external threats to validity (e.g. selection bias, historical, situational and maturational effects) (10). When knowledge gain or behaviour change is being measured, timing is important. If behaviour change is measured immediately after the educational intervention the result is likely to be related to the intervention. If short term gains are expected, this approach should be taken; if the interval between the intervention and assessment is too long, decay can occur and short term impact of the intervention may be missed. Sanazaro (75) reported decay in knowledge among physicians 4 months after an educational programme. However, if long term retention is a goal, repeated post-test or a delayed post-test should be considered.


### 2.3.3 Continuing Medical Education and Patient Outcome

As already noted, the evidence that continuing education improves knowledge and changes behaviour is far from conclusive.

There is even less evidence that continuing education positively affects patients' outcome. Establishing patients' health outcome as related to practice behaviour is hard enough, (56); establishing a causal relationship between continuing medical education and outcome is even more problematic. Patients' health status is usually not considered when assessing the effectiveness of continuing medical education programmes. The variables most often measured are health professional attendance, satisfaction, opinion and attitude, knowledge, skill and physician behaviour.

Bertram et al (5) in their literature review of the evaluation of continuing medical education indicate that out of 113 studies, only 4 measured patients' health status and only one out of these used quasi-experimental design - that of Inui (37), which was discussed in the section on behaviour change.

In conclusion, the studies that best demonstrate the impact of continuing education on knowledge, behaviour change and health outcome are those that used randomized controlled design or time series design. These types of studies are infrequent compared to the bulk of studies on continuing medical education. Definitive evidence of the effectiveness of continuing education is lacking although considerable evidence exists that consumer satisfaction can be demonstrated (53). Although evidence that continuing medical education assures quality of care is weak, there is an urgent need for



studies that avoid the methodologic pitfalls discussed.

#### 2.4 ASSESSMENT OF CONTINUING EDUCATION PROGRAMMES IN NURSING

The major purpose of formal continuing education activities for nurses and other health professionals is to promote new relevant learning and its application in the work setting to improve health care delivery. Unfortunately, most of the research done to date on continuing education programmes in nursing have not been able to demonstrate that this purpose is being met. The studies lack methodologic sophistication. Methodologic concerns are treated lightly, if at all, in reporting results.

Popiel (67) developed a self report survey tool to be used in long range evaluation of continuing nursing education programme. From this descriptive survey she concluded that the educational programmes had led to change in nurses' practice behaviour. This might have been so. However, her only measure was self report which may not reflect actual behaviour. No information regarding the reliability and validity of the survey schedule are given. No indication of response rate to the survey is given and the number of people to whom the survey was distributed is unknown. One cannot be sure those with unfavourable attitudes simply did not respond, or how many responded. Even if Popiel (67) had obtained ratings of performance which showed improved practice performance after the continuing

education programme, the improvement could not be attributed solely to the educational programme. Maturation process or other contemporaneous events might be responsible for the behaviour change in nurses.

Even when a control or comparison group is used in studies, linkages between knowledge gain, practice behaviour and improvement or lack thereof in health care delivery and patient outcomes are not established. In a survey to evaluate the effectiveness of selected continuing education offerings by Condon (12), no educational objectives were specified. The conclusion that the programme resulted in improved nursing care in a majority of the hospitals was based on the report of area coordinator of the education programme. Bias was potentially introduced when outcome data were collected. The in-service director was asked to state what benefits had accrued as a result of the in-service training. It is likely the director interpreted this request as a demand for accountability and responded by producing long impressive lists. The lists were limited to nurses' activities and did not go further to indicate if and how the improved practice was reflected in the patients' health status.

Most of the studies can only be regarded as exploratory. For example, Konefal (44) concluded that continuing education pays off in the nursing of high risk infants. She had noted improvements in the health outcome of infants from the hospitals who took part in the

programme but no improvement in those from non-participating hospitals. Since the hypothesis, continuing education affects nursing practice, implies some form of causal relationship between two variables, a randomized experimental design is needed that will minimize the chance that volunteer bias occurred.

Forni and Overman (29), in their attempt to ascertain the effect of continuing education on nursing practice, did a review of the nursing literature. These investigations queried providers of continuing education programme for nurses regarding how they determined the need for and results of their programme. They found little information included in the responses (59% response rate) to the questionnaires sent out that indicated the need for the educational programme was determined in any objective way. Statements of educational objectives and process criteria relating to desired outcomes were not directly related to individual course offerings. The conclusion about the effect of the programmes were drawn from responses from end of programme evaluation forms completed by participants. A typical form contained information about work location, experience and demographic characteristics of the participants; a statement of reason for participating and about whether the course met the participants' objectives. While this type of outcome may help the administrator in planning future courses, it can only be used to determine the perceived value of the course to the participants but not to assess the effect of the course on actual practice

of nursing.

Puetz and Rything (70) surveyed coordinators of the Indiana Statewide Plan for Continuing Education in Nursing (ISPCEN) to obtain impressionistic information regarding its effect. Although no information is provided regarding the number of surveys mailed, the authors analyzed the responses to the open-ended questions posed in the 57 surveys returned. Response bias was never considered. The analysis is presented by number of analyzable units of response and is not linked to number of surveys returned. Thus, we are told that 58 responses expressed the opinion that the programme had positively affected the quality of care while some kind of negative comment regarding the continuing education programme offered was made 8 times. No information is given regarding who did the content analysis or whether reliability of classification was checked. Bias at this stage in the project may also have occurred. Despite all these problems the authors suggest their survey is a valid indication that some nurses taking continuing education are able to use what they learn. They conclude by calling for more rigorous designs to evaluate continuing education for nurses.

To summarize, most of the studies of the effectiveness of continued nursing education are self report type surveys. Little attention is paid to the overall response rate or the potential biases created by lack of response. Perceptions of the educational

experience and opinions regarding its impact are collected. Little evidence that continuing education affects nurses' behaviour or patients' health is available. The work done to date to show the value of continuing education and ascertain its impact on the quality of nursing has produced, at best, suggestive findings. Yet demand for these courses continues and participants indicate they are meeting their educational needs.

#### 2.4.1 Need for continuing nursing education for pediatric nurses in Nigeria

Although continuing in-service education and quality assurance procedures in health and provision are growing phenomena in North America, nursing practice in Nigeria differs greatly. Rigorous quality assurance procedures are unknown. Continuing nursing education has only recently been introduced in Nigeria (47). Many of the continuing education activities organized for trained Nigerian nurses lack relevancy to specialty areas. In some cases educational activities are organized by people who are not involved in actual nursing practice. In Nigeria numerous infectious diseases put many infants in the high risk group. Those who make it to the hospitals require care from nurses who possess more than minimal competence to prevent complications that can lead to fatal outcome. The aim of this study is to provide a continuing education programme for registered nurses who have little previous experience in pediatric

critical care nursing to the standard that will enable them to give better quality of nursing care to this group of infants.

DISEASE	COMPLICATIONS	CASE FATALITY
MEASLES	Pulmonary Infection 50%	2.2%
TETANUS	Respiratory Obstruction 90%	98%
MENINGITIS	Neurological Symptoms 50%	57%

Present resources in the health care system cannot meet the extra cost of training nurses in pediatric critical care where such training requires expensive resources, nor can the already understaffed hospital wards afford to release the nurses. Even if the cost and time could be afforded, most of these nurses are adults with families who cannot pursue post basic nursing in a formal academic setting.

What else makes this continuing education so necessary? In Nigeria the answer is all too clear. There is a great shortage of pediatricians, indeed a shortage of doctors as a whole. The doctor/patient ratio is given as 1:20000. There is greater dependence on the nurses than is the case in countries where there are adequate numbers of pediatricians. Very often the nurses must take action and

initiate therapy before medical aid arrives. It is not uncommon for medical aid not to arrive until it is too late. Stimulated by this state of affairs and motivated by the desire to tap the unexplored resources of the registered nurses working in pediatric wards, this author proposes a study of an in-hospital continuing education programme which, if effective, can be adopted by the hospitals as on-going method of assuring good nursing care for critically ill infants.

The aim of this study is to provide a continuing education programme for registered nurses who have little previous experience in pediatric critical care nursing. The objective of the education programme is to train nurses to give better quality of nursing care to infants with pathophysiological states that commonly occur in infants suffering from measles, tetanus and meningitis. To test the effectiveness of this continuing education project an evaluative design using quality of care measures is developed to assess the education programme impact of knowledge gain and behaviour change in participating nurses and child health outcomes among patients treated.

The shortcomings in the studies done so far in the area of continuing education in nursing points to a need for an evaluative design that links education with knowledge gain, behaviour change and health outcome. The work done to date to show the value of continuing education and ascertain its impact on the quality of nursing has produced, at best, suggestive findings. No definite answers have emerged.

## CHAPTER 3

### RESEARCH PROPOSAL OVERVIEW

The question that this thesis proposes to answer is:  
Does continuing education improve nurses' performance in their care of infants with measles, neonatal meningitis and tetanus as measured by a substantive and statistically significant increase in knowledge, and both process and outcome measures of quality of care?

### DESIGN OF THE STUDY

#### (1) The Design Architecture

A randomized controlled trial with baseline and post-manoeuvre measures will be the experimental design employed to answer the research question. Eleven hospitals that satisfy the entry criteria will be identified. Nine hospitals will be randomly selected from this group. By random allocation again (3) will be selected as experimental, (3) as control and (3) for pre-testing and reserve. The indicator condition strategy will be used for the process and outcome studies. This strategy has been used and shown to be effective in many studies (8,42,79). Measles, neonatal tetanus and

meningitis are selected as the diseases for the quality of care studies. The rationale for selecting these three diseases is that they have high incidence and mortality rate among 0-5 year age group in Nigeria (39,72). Also, research shows that there are effective immunization and therapeutic regimens that reduce morbidity and mortality in these diseases (39,72).

From hospital records in both the treatment and control hospitals, clinical process and patient outcome data will be collected on infants that had been treated for the selected diseases prior to commencement of the educational programme. The outcome data will include intermediate outcomes such as fluid and electrolyte balance, respiratory function and seizures. This data collection will go back for a period of three months which is the same time period allowed to complete assessment after the educational intervention.

Why 3 months interval?

1. Infants who suffer from the diseases to be studied are admitted into Nigerian hospitals at the rate of 4 a week for measles, 3 for tetanus and 3 for meningitis. The sample size needed to study these diseases are 20,20,28 respectively in each group. From the admission rate above it is estimated that 3 months will be the length of time required to enter sufficient number of patients into the study after the educational intervention.

2. If the interval between the time the educational intervention takes place and data collection on process of care is too long, the initial effect of the education on the nurses' practice behaviour might be missed. Deterioration of physicians' performance four months after an educational intervention has been documented<sup>4</sup>(75). It is important therefore that all data are collected within a 3 month period.

It will only be feasible to follow up individual patients to see what complications they develop for as long as they are in the hospital. The normal hospitalization period for infants with these diseases is about a month. From the natural history of these diseases, recovery, mortality or other health outcomes of interest would occur during hospitalization period. Outcome measures will be taken at 2 weeks and 1 month following the intervention. The earlier measurement will pick up early and temporary improvements that could be missed if data on all the patients are collected at 1 month.

In Phase 2, if the randomized study shows the education programme to be effective, the education programme will be given to the control hospitals as a before-after study. This manoeuvre is instituted to validate the comparability of the hospitals in the experimental and control groups in the randomized study by demonstrating that the quality of care in the control hospitals shows a similar

improvement. It will also make participation in the study more attractive if all hospitals know that they will eventually receive the educational programme. The rationale for the major features of this design is given below.

(i) Control Group

Whatever the experimental variable in any study, a change in the group exposed to that variable might result from factors such as maturational process. In this case, if one has a pediatric ward that is staffed by newly registered nurses, their care of sick infants after some period of time is likely to improve with experience.

The change might also result from other contemporaneous events such as a change in the health services system, e.g. increased funding throughout the province leading to employment of more nurses. The patients would have more attention and this would improve quality of care in both experimental and control hospitals.

The reactive effect (Hawthorne effect) of the research procedure can also affect the result. The knowledge that they are selected for a study can make them feel special and strive to perform better than usual. It would be possible to estimate this effect by having another control group of hospitals who only receive the knowledge assessment test at the end of Phase I without knowing that they were being studied until at the time of testing. However, this would

probably not be feasible since it would mean traveling to hospitals much further off away from the geographical setting of the other hospitals in the study. Apart from the fact that this distance might make this second control group non-comparable, the added expenses would be quite significant. Direct observation can also produce Hawthorne effect when data is collected on actual behaviour. The fact that people are being observed can make them change their responses to please the observer.

Establishing a concurrent control group enhances the internal validity of the study since whatever external factors are experienced by the experimental group over the period of the study are likely to be experienced by the control group. A study by Campbell and Dunnette (11) on the effects of sensitivity training groups ("T groups") is a good example of this. A control group may not completely rule out the possible alternative hypotheses but it does reduce their plausibility.

(ii) Randomization

The task of creating groups that are equivalent in all respects is an impossible one. In the long run, the basic safeguard against confounding variables between experimental and control groups, is randomization. It does not remove the differences but one hopes that this manoeuvre distributes the differences evenly between the groups.

- (iii) Introduction of the educational programme in the control hospitals after the initial comparison of the treatment and control hospitals.

By introducing the educational programme in the control group, the result of the post educational manoeuvre in this group can be used to validate the result in the treatment hospital. The observed change in this control will then be compared with the change observed in the treatment group. If the changes are the same, then this can be attributed to the educational intervention.

- (iv) Before-After assessment when there is a control group.

The assessment made before the educational activities are introduced is useful in allowing the experimenter to decide how similar the baseline performances in the different groups are.

In the proposed study the measures made on the nurses' activities before the educational intervention is particularly important since this is an experiment designed to observe change in the nurses' practice behaviour. It is also crucial in the planning of the education programme to know how much room there is for gain in knowledge. Nurses that already have a high level of knowledge cannot show as much knowledge gain as those that are much lower than the required level.

POSSIBLE OUTCOMES

1. Knowledge gain may not be demonstrated by nurses in the treatment hospitals. This would indicate that either there was no room for change in the first place or that the failure is due to the implementation of the educational programme itself.
2. Knowledge gain may be demonstrated in the treatment hospitals but the quality of care remains the same in both treatment and control hospitals. This would indicate that increase in knowledge does not necessarily change practice behaviour.
3. The quality of care may increase equally over the study period in both treatment and control hospitals. If this happens it would suggest that it is either due to a Hawthorne Effect or that there are other contemporaneous events taking place in the control hospitals.
4. Knowledge and quality of care may increase in the treatment hospitals but not in the control hospitals. This would probably support the hypothesis that continuing education has effect on nurses' practice behaviour and impact on patients' health outcome.

## CHAPTER 4

### SAMPLING AND SELECTION CRITERIA

#### 4.1 NURSES

With the consent of the hospital administration, the educational programme will be offered as an in-service training to nurses who work in the pediatric wards. All the nurses practising in these wards will be eligible for the study if they satisfy the following criteria.

1. Are registered nurses.
2. Will work in the same ward for at least 5 months from commencement of the study.
3. Have no post-basic training in pediatric special care nursing.

If there are any nurses on the ward who have had special pediatric training, they will be included in the educational programmes, but they will be excluded from the measurements of knowledge gain and change in behaviour. It is likely that educational or service leadership positions, for example a head nurse position, may be held by nurses within this group who have had post-basic training. Such nurses, therefore, should be included in the educational programme so they will

understand the explicit criteria to be carried out by nurses on the ward under their supervision. If the educational or service leaders were not involved in the educational programme it is possible they might inadvertently have a negative attitude to some of the changes in performance, resulting from the application of the explicit criteria. This, in turn, might impair the performance of the nurses and affect the quality of care.

#### 4.2 INFANTS

##### 4.2.1 Prognostic Stratification

To have an objective evaluation of the effect of nursing on the patients, the current medical condition of the patients should be determined on admission. Although steps are taken to select hospitals that are as homogeneous as possible, infants who are admitted to the wards come in with diverse initial features such as co-morbidity. The duration and severity of the disease may vary. In order to remove this prognostic heterogeneity, the cohorts will be divided into strata of members with similar prognostic expectations. The effect of nursing can then be compared within members of the same prognostic stratum within hospitals and between the treatment and control hospitals. Failure to carry out this stratification may lead to distortion of scores of outcome measures. If a significant difference is obtained in the statistical analysis, it may be due entirely to differences in the proportions of the prognostic strata.

On the basis of the clinical and/or laboratory findings, infants admitted with one of the three diseases as the primary diagnosis will be classified as mild, moderately and severely ill with accompanying survival rates for each stratum. Criteria for classification into these three strata will be established by the pediatrician in charge prior to commencement of the study.

Infants that fall into the strata of moderately ill and severely ill will be identified as those needing special care nursing. These are the ones that will be studied.

As the sick infant is admitted into the ward, he/she will be admitted into the study if he/she satisfies the following inclusion criteria:

1. Age between 0 - 5 years.
2. Primary medical diagnosis is established either clinically or by laboratory test as measles, or tetanus, or meningitis.
3. Meet the moderately or severely ill criteria.
4. Lives in the area served by the study hospitals.
5. Does not have other serious co-morbid disease such as sickle cell anemia, severe burns, cerebral malaria which, by their natural history, are known to have serious sequelae or fatal outcomes independent of the associated measles, meningitis or tetanus. Infants with co-morbid

conditions that are prevalent in the society but which do not commonly have serious outcomes will be included in the study. Examples of these are protein-calorie malnutrition, malaria, worm infestation and anemia. This method of handling co-morbidity in the study reflects the reality of the health status of children in that society.

Exclusion criteria will be:

1. Age over 5 years.
2. Lives outside the area served by the study hospital.
3. Mildly ill on admission.
4. Primary medical diagnosis is doubtful.
5. Admitted to the ward with complications of the disease of interest.
6. Has other serious co-morbid disease as previously defined.

The pediatricians who assess these infants for classification into the prognostic strata will be tested for intra and inter agreement in both the treatment and control hospitals prior to the start of the study.

#### 4.3 HOSPITALS

For this study, general hospitals will be selected from Oyo

State, one of the nineteen states that make up the Federal Republic of Nigeria. It will be desirable to limit the distance between the research centre, University of Ife and the study hospitals to 60 miles to make the hospitals easily accessible to the researchers.

A general hospital in this thesis will be defined as a hospital that has all of the following: a general out-patient department and special clinics for medical, surgical, psychiatric, obstetric and pediatric clinics. Patients could be admitted into the wards through any of these channels.

These hospitals in Oyo State serve a mixture of urban and rural population where the main occupations are farming and trading. In most of these areas there is piped borne water but overcrowding, malnutrition, poor sanitation, poor housing, bad roads and infectious diseases are still very much forces to be reckoned with, and factors to consider in health delivery.

In the section that follows, major characteristics of the hospitals that will be considered when selecting them for the study is discussed. They should be comparable in respect of the following features:

(i) Location

The hospitals should be situated not closer than 20 miles from each other. This is to prevent contamination of the control group as

a result of the nurses in the treatment group communicating their educational activities to those in the control group. In Nigeria, 20 miles is a reasonable distance to keep activities apart because inadequate means of transport limit peoples' movements to what is absolutely necessary.

As observed earlier, most of the people in the area that these hospitals serve are farmers and traders. Since occupation is a factor that influences utilization of health services in Nigeria, it is reasonable to assume that the type of patients admitted into both the treatment and control hospitals will be very similar.

(ii) Nurses and Physicians

Each pediatric ward of all the study hospitals should have at least ten registered nurses. A registered nurse is a nurse that has undergone three years training in basic nursing and is registered with the Nigerian Nursing Council. Some hospitals may have nurses who have done post basic training in midwifery. No distinction will be made between these two types of registered nurses because this post basic training does not include formal training in special care nursing. Hospitals whose pediatric wards have nurses who are trained in pediatric special care will not be selected for the study. This criterion is intended to eliminate nurses who already possess knowledge of how to care for infants needing special care. They may not show knowledge gain as a result of the continuing education. The standard of care

score in the hospital with these types of nurses might be higher than those without.

Each hospital should have at least one pediatrician in charge of the pediatric unit. It is not likely that the number will exceed two in any of the hospitals. Hospitals with more than two should not be selected. Having a pediatrician in attendance often will reduce the amount of responsibility the nurses assume for the care of the infants. This would defeat one of the purposes of the thesis which is to assess how much nursing intervention can make a difference in the patients' health outcome.

In general, there is little variation in the number of physicians serving each hospital, therefore the number in each study hospital will be basically the same. If there are one or two pediatricians in one hospital and a greater number of non pediatric trained clinicians in the same hospital, the effect on special care could be the same as having many pediatricians when it comes to dealing with emergency treatments.

A pediatrician will be defined as a person with the qualification of M.B. B.S. with special training in pediatrics. He should be registered with the Nigerian Medical Council.

It will not be necessary to stratify the hospitals by size since most of the general hospitals in the area to be studied are

similar in size.

(iii) Rate and Source of Admission

The hospitals' admission records will be studied to ascertain first, the number of patients admitted a year and any seasonal variation, secondly, the route by which they are admitted into the wards. The importance to the proposed study of determining the rate of admission is to ensure that there will be sufficient number of episodes for each disease available for statistical analysis. Again, if the rate of admission is significantly different in either the control or treatment hospitals, the performance and outcome scores in the less busy hospitals may be highly inflated because the nursing and medical personnel have more time, therefore they may give more attention to their patients.

Teaching hospitals or any hospital that accept patients through referral system for tertiary care will not be included in the study. The source of admission should be the same otherwise some hospitals will have highly selective patients with better prognostic expectations. The intermediate and final outcome in those hospitals may be wrongly attributed to improved care. The patients should all come through the primary care units, special clinics and the emergency department.

(iv) Career Mobility and Attrition

Before the hospitals are invited to participate in the study, information will be obtained regarding amount of movement of the nurses within the hospital units. It will be necessary to know the length of time each nurse spends on the ward and how annual leave arrangements will affect the total number of nurses working on the ward during the study period. Attrition between before and after measures may inflate the score of the process measures if the nurses who demonstrate less change in practice behaviour leave the hospital. The reverse can also happen. With all the care taken to control the factors just discussed, it is important to realize that there are hospital features that could influence the nurses' response to the educational programme. The two main features identified are inadequate equipment and high patient/nurse ratio.

If there is gross shortage of equipment or lack of appropriate equipment, it may be impossible for the nurses to put into practice the knowledge they gained during their learning experience.

Quality of nursing might be sacrificed for quantity if the nurses suddenly find themselves managing too many patients on the ward.

## CHAPTER 5

### THE EDUCATIONAL PROGRAMME

#### 5.1 INTRODUCTION

The continuing education programme for nurses will be designed to increase knowledge, change nurses' practice behaviour and also, will hopefully, be reflected by an effect on the patient health outcome.

The main elements of the educational programme therefore are:

1. To develop a continuing education programme for nurses in the pediatric critical care unit, with particular attention to relevancy, feasibility, effectiveness and content validity.
2. To develop and pre-test this educational programme in reserve hospitals which are comparable to the experimental and control hospitals in order to establish relevancy, feasibility and effectiveness.
3. To apply the educational programme to the nurses in the experimental hospital but not the control hospitals in a randomized controlled trial.

## 5.2 DEVELOPMENT OF THE PROGRAMME

### 5.2.1 Indicator Conditions

The programme will centre around the indicator condition approach described on previous pages. Indicator conditions may be diseases, injuries or pathophysiological states (40, 77). The indicator condition approach is chosen because it has been demonstrated to be sensitive, reproducible, feasible and acceptable. The use of indicator conditions in this study will enable the researcher to:

1. Develop the educational programme in manageable units - one for each indicator condition.
2. Ensure that the explicit criteria for the appropriate nursing management of each indicator condition are included in the education programme.
3. Permit the measurement of the relevant knowledge gained by the nurses concerning each indicator condition.
4. Finally, it enables measurement to be made of any change in nursing behaviour in meeting the explicit criteria for each indicator condition.

Patients to be studied will be those suffering from one of the three diseases, namely,

Measles

Tetanus

Meningitis

The pathophysiological states which patients suffering from any of these diseases may develop are:

1. Significant temperature elevation - a temperature of more than 103°F (39°C)
2. Respiratory complications including
  - (i) Tachypnoea
  - (ii) Hypoxia
  - (iii) Respiratory obstruction
  - (iv) Respiratory failure
3. Dehydration and electrolyte imbalance
4. Neurological complications including altered state of consciousness, convulsions and/or raised intra-cranial pressure.

In this study we are designating these abnormal pathophysiological states as the indicator conditions. Explicit criteria for the adequate management of these indicator conditions will be developed for each condition and the educational programme will be based on these.

### 5.2.2 Rationale for Selecting These Indicator Conditions

The utility of the evaluating method using indicator condition in this study will be determined to a significant extent by the selection of the indicator conditions. Generally, these conditions are selected because they are pathophysiological states that occur in many infants who are critically ill. Specifically, the indicator conditions selected have been documented as common complications of the three diseases selected for the quality of care assessment. The importance of these indicator conditions in the management of infants suffering from these diseases is fully discussed in Section 6.2.2.

### 5.2.3 Educational Objectives

For each indicator condition, educational objectives will be developed. Each objective will be related to a set of explicit criteria. For example, if the indicator condition, convulsion, is chosen, the relevant educational objectives and explicit criteria will be developed thus:

#### CONVULSION

##### Educational Objective:

1. The nurses should be able to recognize these signs and symptoms indicating that a patient may be developing a convulsive disorder.

**Explicit Criteria:****Observe and Record**

1. Any change in level of consciousness.
2. Any increased restlessness or irritability.
3. Any uncontrolled or involuntary movements such as clenching of teeth, rolling of eyes, movement of any limb.
4. Any unusual response to stimuli.

**Actions**

1. Review orders written for sedation or anti-convulsants.
2. Administer appropriate sedation as ordered.
3. If a general duty nurse, notify staff nurse.
4. If staff nurse, notify pediatrician of patient's condition, any medication given and if additional medication is required.
5. Record any new orders.
6. Carry out any new orders.
7. Ensure that bed rails are adequately padded and that suctioning and resuscitating equipment and anti-convulsant drugs are at the bedside.
8. Continue to monitor
  - (1) Spontaneous movement.

- (ii) Change in vital signs; pulse, respirations, pupils, movements, neck rigidity and level of consciousness.

9. Put patient in quiet room.

† Educational Objective:

2. The nurses should be able to effectively manage a patient who has developed a convulsion so as to prevent damage, control attack and maintain respiration.

Explicit Criteria:

1. Control patient.
2. Position patient so that head is turned to one side.
3. Keep airway clear by preventing the tongue from falling back.
4. Give O<sub>2</sub>.
5. Get assistance.
6. Administer medication.
7. If no sedation or anti-convulsive medication ordered, prepare appropriate medication for medication while waiting for the pediatrician's orders.
8. Observe site of origin and spread of any involuntary movements.
9. When convulsions are controlled, record each of the above actions and observations.

10. Review orders again to ensure adequacy.

#### 5.2.4 Educational Format

The general format for the educational programme will be a combination of lectures, group discussions and handouts.

##### Lectures

One lecture will be developed for each indicator condition. The contents of the lectures will be standardized for all the experimental hospitals. The main purpose of the lecture will be to give the general overview of the concepts and principles involved in managing patients with each indicator condition and to reinforce previously acquired knowledge. With this teaching format, the transmission of information is faster and the contents of the educational units are standardized for all the nurses. Each nurse will attend one lecture on each indicator condition.

##### Group Discussion

While the nurses are engaged in the education programme they will continue to carry out their clinical duties. The group discussion will be clinically based on clinical cases with each indicator condition on which the educational programme is developed. Emphasis in the clinical sessions will be clinical recognition of signs and symptoms, observations and making judgements about intervention. This method will allow learning and evaluation to occur at the same time.

The instructor will be able to obtain feedback on the level of understanding of the nurses and plan subsequent problems accordingly. It will also allow immediate group feedback that can help each group member ascertain her own level of knowledge and understanding, and further shape her ideas.

In addition to increasing the knowledge that nurses have about the indicator conditions, the ultimate purpose of the educational intervention is to effect a change in the nurses' practice behaviour. It has been assumed that increase in knowledge automatically changes behaviour but Williamson (87) and others have shown that this is not necessarily so. In Williamson's study an educational programme was instituted to make physicians react or respond to abnormal laboratory findings shown on patients' admission charts. Three repeated attempts at bringing to the notice of the physicians the importance of responding to these abnormal findings failed to achieve behaviour change. This objective was finally achieved when behaviour modification measures were used, namely, covering the abnormal laboratory reports with fluorescent tapes. When physicians had to remove the tape in order to read the reports, their appropriate response to the abnormal laboratory data increased significantly. Thus, in the Williamson study, one cannot say with any degree of certainty that the physicians failed to respond despite increase in knowledge about the significance of these abnormal results. On the other hand, since the physicians did respond appropriately following the special behaviour modification manoeuvre, it can be

argued that there was no deficiency in knowledge. This study demonstrates that acceptable educational activities did not change physician behaviour. Additional strategies were needed to change behaviour.

The learning experience provided by the educational programme will incorporate a teaching format to encourage change of behaviour in the nurses. The discussion method is used commonly in educational programmes and has been shown to be effective in changing behaviour. Lewin (49) demonstrated this when he studied the reaction of housewives after participating in an education programme which divided them into lecture and discussion groups. The experiment was carried out to change food habits of volunteer Red Cross groups. The objective was to increase the use of nutritious but unpopular foods such as beef hearts, sweet breads, and kidneys. The volunteers were divided into six groups of approximately equal size. Three groups had a lecture only, and three groups had a general discussion. Interested volunteers in the discussion group could then attend a further session with a nutritionist on how to prepare these foods. A follow-up study showed that 35% of the volunteers in the discussion group and 3% of the volunteers in the lecture group changed their attitudes and served one of these foods in their homes. Unfortunately, this was not a randomized control trial, the comparability of the cohorts in the groups was not assured, there was no measurement of knowledge gain in the six groups, and more important, we have no measurement of the amount of information given to each of the groups. Accepting the methodological limitations of the

study, it suggests that discussion method encourages behaviour change.

In this nursing education study we will attempt to standardize, as much as possible, the amount of information transmitted to the nurses in each of the experimental hospitals.

#### 5.2.5 Steps Taken to Ensure Standardization

The lectures will be given by the pediatricians in each of the experimental hospitals. The pediatrician participating in the criteria and education development group (See Section 6.1.2) will be responsible for developing guidelines for lecture on each indicator condition, taking into account suggestions from the nurse tutor to ensure that he covers areas that are relevant to nursing. These lecture guidelines, having as the sub-topics to be covered in the lecture the explicit criteria, will be given to the pediatricians in all the study hospitals. This will ensure that the contents of the lecture for each indicator condition are approximately the same in all the hospitals.

The clinical discussions will be standardized as to topic (indicator conditions) and frequency (two clinical discussion sessions focussed on two separate patients with each indicator condition). Each nurse will, therefore, attend two clinical discussion sessions for each indicator condition. The content in each clinical discussion will be standardized as carefully as possible by having each nurse tutor provide

to the researcher a check-off list of the explicit criteria presented and discussed in each group encounter.

For each indicator condition there will be printed materials summarizing key features of the indicator conditions and the explicit criteria. Each nurse will be given one handout for each indicator condition.

The complete education programme will consist of:

- 4 lectures
- 8 discussion sessions
- 4 Handouts

In summary, therefore, an educational programme will be given to the nurses to be studied in each of the experimental hospitals. Using the analogy of a drug trial, the education "dose" will be standardized as carefully as possible as to frequency of administration, the amount of content, method of administration and relevance of material. It is hoped, therefore, that the knowledge gain in the nurses in each of the experimental hospitals will be equal so that the amount of knowledge gain will not be a confounding variable.

#### 5.2.6 Who develops the programme?

The following will make up the group that will identify the indicator conditions and develop the programme:

1. Senior Nurse Tutor: This is a registered nurse who is also trained in pediatric nursing and has a degree and teaching diploma.
2. Pediatric Ward Sister: The ward sister is an experienced nurse who supervises the clinical and administrative activities of the ward. She works with the other nurses all the time and is in a better position to observe the deficiencies and note the areas of nursing that require corrective actions.
3. Staff Nurse: This is a registered nurse who carries out most of the clinical activities involved in the care of infants requiring special care.
4. Pediatrician: He is responsible for the medical care of the infants. The input from a physician is necessary for identifying clinically important signs and symptoms to be observed from the indicator conditions.

All these personnel are needed to ensure relevance and feasibility of the contents of the educational programme. From this joint contribution of ideas, the nurse tutor will have the responsibility of developing the educational programme, and of advising tutors from the three treatment hospitals on the implementation of the programme. All the group members, except the senior nurse tutor, will be selected from any of the three reserve hospitals. Pediatricians, nurse tutors,

ward sisters/head nurses and staff nurses from these reserve hospitals will be asked to nominate their peers to represent them in the criteria and educational development committee.

#### 5.2.7 Testing of The Educational Programme

The educational programme will be regarded as completed and ready for testing when the following conditions are satisfied:

- (i) The contents of the lectures for the four indicator conditions itemized and guidelines for presentation drawn up.
- (ii) The contents of the discussion sessions listed and a checklist provided for the contents to be discussed for each indicator condition.
- (iii) One handout summarizing key features of the lectures and discussion sessions prepared for each indicator condition.

The completed programme will then be tested on a group of ten nurses in the second reserve hospital for relevance, feasibility and effectiveness. In addition to assessing these features of the education programme, the nurses will be tested for knowledge gain.

##### A. Feasibility

The most important factor that will determine the feasibility of

the educational programme will be the time available for the lectures without having to disrupt the normal functioning of the wards, and also not having to ask the nurses to attend the lectures in their own time. It might be difficult to get the nurses to cooperate. To overcome this, the lectures will be given at the end of each shift. There is usually a 20-minute overlap between the shift duties. The nurses completing a shift will be able to leave the ward 30 minutes earlier because those starting the shift would have been on the ward already. In this way, the one hour lecture will only take 30 minutes of the nurses' time. Since this arrangement makes very little demand on the nurses' time, there will be increased cooperation on their part.

#### B. Relevance

The contents of the educational programme should be relevant to the needs and practice of the nurses who care for infants requiring special care. If the nurses' area of practice and the programme contents have no commonality, the effect of the education on nurses' performance would be impossible to determine since the education offering and the area of practice do not overlap at any point. For example, a continuing education package whose contents are on psychosocial problems would not contain suitable contents for pediatric nursing. This criterion would have been satisfied during the initial development of the educational programme because the personnel involved in the care of the infants made up the group that identified the contents for the programme. To establish relevance of the educational programme, a consensus

will be obtained from the members of the group that develops the programme as to the relevance of the contents to the area of practice of each member. Also, the nurses in the reserve hospitals on whom the programme is tested will be asked to rate the programme in terms of usefulness in pediatric special care nursing, newness of information and degree of difficulty using appraisal questionnaire. See Appendix II.

### C. Effectiveness

The programme will be considered effective if the nurses in the testing hospital demonstrate a gain in knowledge at the completion of the programme. To assess knowledge gain, a pre-test will be carried out before the educational intervention, and a post-test after. Higher post-test scores will indicate that nurses have increased their knowledge as a result of the educational programme.

#### 5.2.8 The Post-Test

The post-test in this case is not given for formative evaluation as part of an education process to assess progress in learning. Rather, it is a summative one given as part of the research manoeuvre to assess knowledge gain. This latter use of the post-test needs to be discussed in relation to the pre-test.

Ideally, the same test items should not be used in both the pre and post tests. Different test items of same difficulty should be

used to avoid inflation of ~~post~~-test scores as a result of the nurses merely reproducing the answers to the questions because they remember them from pre-test. It is difficult to assess knowledge when this happens. However, it will not be possible to use parallel tests in this study. This approach requires time, material and human resources that will allow the test items to be analyzed and validated to make sure that test items during the pre and post test periods measure the same level of knowledge. Unless this is assured, no valid conclusions can be drawn about the result of the post-test. For practical reasons, therefore, the same test items will be used for the pre and post test. In order to minimize the effect of test re-test on the post-test scores, the answers to the questions will not be discussed until after the post-test.

#### 5.2.9 How Will Learning Be Assessed?

The pre and post tests given to assess knowledge gain will be made up of multiple choice questions. This is the most common technique for assessing students learning (54,62,71). It consists of a "stem", usually a problem or question with a set of alternative answers, only one of which is correct. One of the advantages of this technique is that the test items can be objectively scored and the potential teacher bias is effectively removed.

The success of this test technique depends very much on setting

a performance level for the test before the test is carried out. There are several methods of doing this. For this study the performance level will be based on the number of fail, or totally incorrect options for each item in the total test. Response options in multiple choice questions are usually written to indicate "correct", "incorrect" or "fail" answers and one test item may have any number of "fail" and/or "incorrect" options. When all the test items are written out for all the indicator conditions, the "fail" options in each item will be checked off. The reciprocal of the number of remaining options will be written next to the test item. The sum of all the reciprocals (M) will then be regarded as a "guess score" for a student who has enough knowledge to reject all the "fail" options in the test. The passing score (P) is found by using the formula:

$$P = M + \sqrt{N}$$

where N is the total number of items in the test. This approach is chosen because it ensures that the individual test items relate to learning objectives and the contents of the educational programme; thereby, ultimately ensuring that the total test validity assesses the nurses' learning by judging it according to pre-established criteria which reflect the indicator conditions being studied. The following table demonstrates the assessment of learning described above for one test item.

<u>OPTION</u>	<u>RESPONSES</u>	<u>GUESS SCORE</u>
A	FAIL	
B	INCORRECT	
C	CORRECT	1/3
D	FAIL	
E	INCORRECT	

On the basis of the results obtained from the post-tests and feedback with particular reference to relevance, feasibility and effectiveness of the programme from the testing hospital, the programme will be revised by the same group that developed it. The revised programme will be given to the third reserve hospital for final testing. The acceptable level of performance in the post-test will be a group mean score of 80% or 20 points above the mean pre-test score. If this is not achieved, the result of the post-test will be examined to identify areas where performance was poor. If poor performance was scattered in a number of areas and shows no consistency in pattern, the instruction materials and method of implementation will be reviewed to ensure clarity and relevance. Some reinforcement of the educational programme may be required. If there is a particular pattern of sufficient knowledge gain, for example, in the explicit criteria for handling convulsions, then this component of the educational programme will be examined and, if necessary re-written to ensure relevance and clarity. Revision of the pre and post test may be necessary if there is

ambiguity or lack of clarity. It is reasonable to assume that with the appropriate review and revisions as outlined, the nurses will achieve the group mean score of 80% on the post-test or 20 points above the mean pre-test score. There would be a reasonable expectation that the nurses in the experimental hospital receiving the same educational package would achieve the same score.

#### 5.2.10 Implementation

A pre-test will first be carried out in both the experimental and control hospitals using multiple choice type questions. The tested educational programme will then be delivered to the experimental hospitals to be implemented by the pediatricians and nurse tutors in those hospitals. The guidelines drawn up by the pediatricians and the nurse tutors to ensure standardization of the lectures and clinical discussions during the development of the programme will be followed in each hospital.

During the period of implementation the research team will not make their influence felt in any of the hospitals. If there is interference by the research team, whatever significant difference is observed at the end of the study might be a Hawthorne effect rather than the effect of the educational programme. It is important to note that whatever activities, no matter how small, even if it is only a telephone call to the nurse tutor to give her season's greetings in the experimental

hospital, should also be done in the control hospital.

Each hospital will commence the educational programme at the same time to ensure that the effect of history is the same in all the hospitals.

At the completion of all the lectures and clinical discussions a post-test will be given, using the same test items as for the pre-test. It is hoped that given the design of the pre and post test on the nurses in the reserve hospital and the revision of the educational programme a satisfactory level of knowledge gain will be attained in the treatment hospital where this educational programme is to be applied.

## CHAPTER 6

### ASSESSMENT OF CHANGE IN QUALITY OF CARE

#### 6.1 MEASURES DEVELOPMENT

##### 6.1.1 Methodological Features of Process Measures

###### Criterion Validity:

Whether process, structure or outcome approach is used in evaluating quality of care, the ultimate interest is the functional status of the patient (health outcome) (15, 56). Process measures, therefore, should be acceptable as indicators of quality of care only if they have been shown to predict the functional status or survival of the patient. An example is if a child is admitted with severe croup, it is well documented that failure to restore respiratory function might threaten the child's survival. In this instance, if the process assessment for the management of this child includes tracheotomy operation, it would be accepted as having criterion validity.

Realizing the importance of this criterion in process measures, many researchers have attempted to validate process measures against health outcome. Fessel and van Brunt (25) did a series of three studies. The first study sought to determine whether recording a greater number of signs and symptoms (process) led to more accurate

diagnosis of appendicitis (outcome). This study found no correlation between process and outcome. The shortcomings in this study are discussed fully in Section 2.2.2. It seems from this study and many others that have failed to establish correlation between process and outcome, that the failure is due to insensitive process items, inappropriate outcome variables and lack of control for confounding factors.

#### Clinical Credibility:

For a process measure to be accepted as valid, it must make "biologic sense". It is only when this is the case that the measure can be accepted as being credible. To use the same illustration of the child with the croup: In the management of this child it is not clinically sensible to include in the criteria set, rectal examination. This particular process has not yet been shown in the present knowledge of medical practice to make biologic sense in the management of croup. If process items that are not likely to make any difference in the patient's health outcome are included in the management criteria, they are likely to render the whole process assessment incredible.

#### Accuracy:

A process item is accurate if it denotes exact or true value of the measurement. Incomplete or inconsistent recording renders a process item inaccurate. When this happens it is impossible to determine true performance. Some actions are performed but not recorded (33, 64).

### Comprehensiveness:

Process assessment is comprehensive if it includes all aspects of nursing care that are clinically significant in the management of the particular condition. For example, process criteria for the management of a child with pneumothorax would not be regarded as adequate if the items performed are positioning, sticking a needle into the side, and does not include administration of 100% oxygen to hasten the resolution of accumulated air and retard further accumulation. Needle aspiration and administration of 100% oxygen do not have high correlation therefore the latter has to be included in the list of criteria items. Some studies that relate process to outcome have shown that the comprehensiveness of diagnostic and therapeutic process are significantly related to patients' clinical state (30).

### Sensitivity:

Process criteria as evaluation tool should be able to detect important changes in the attributes of interest. If the attribute of interest is the nurses' practice behaviour, process studies should be able to detect the difference between current practice and the standard set by experts. Well controlled studies in nursing that demonstrate this point are rare but a number of studies in medicine have demonstrated these deficiencies (7, 37, 86).

Where there are identified deficiencies, process measures should be sensitive enough to demonstrate change when the nursing

practice changes; e.g. as a result of educational or administrative interventions. Quality of care has been shown to improve following the application of the process criteria to correct deficiencies (7).

#### Acceptability:

Process measures should conform with generally acceptable standards of good quality as set out in leading textbooks and articles based on scientific study. It should be acceptable to the health professionals who will use the criteria.

#### Amenability to Index Construction:

For purpose of analysis, process items should be constructed to yield a range of scores. Sibley (79) used categorical scale to permit "scoring indicator condition and drug use episodes as adequate or questionable."

### 6.1.2 Steps in Development of Process Criteria

#### 1. Who will set the criteria?

A group composed of nurses experienced in pediatric special care, a peer representative and pediatrician will set the criteria. In most quality of care studies the criteria for management of the indicator conditions are set by a peer group. It would not be appropriate to do that in this situation since the author's wish is not to establish criteria based on current peer practice behaviour. Rather, she wishes to raise the level of practice to that of the expert

group's standard by education and use those standards to assess whether the educational programme has worked well. The aim of the educational manoeuvre is to increase knowledge and skill to that of nurses experienced in pediatric special care.

## 2. Identification of Issues

The first step will be to define all the important nursing functions for a specific clinical situation or indicator condition within each of the following areas:

- (i) Observation
- (ii) Management decision
- (iii) Communication
- (v) Provision and the Maintenance of safe and therapeutic environment

For example, if the specific clinical situation is elevated temperature above 103°F (39°C), the group will come to a consensus about all the important observations the nurse should make, the clinically significant intervention the nurse should carry out independent of the physician, how she should communicate her observations and interventions to other members of the health team, measures she should take to prevent injury to the child and how she should arrange the environment to enhance recovery.

### 3. Explicit Process Criteria

Each of the activities that the panel agrees upon above will be transformed into explicit process criteria. For example, if one of the important issues is that the nurse will observe for signs of raised intracranial pressure, what the nurse has to observe to demonstrate that she has performed the function of observing satisfactorily will be delineated. An example will demonstrate this better:

NURSING FUNCTION	INDICATOR CONDITION	EXPLICIT PROCESS CRITERIA
Observation	Raised intracranial pressure	Examine fontanel Note if tense or bulging Note any vomiting Indicate whether projectile Measure head circumference daily - note any increase • Note any irritability •

### 4. Methodologic Standards for the Criteria

A criterion must be clinically credible. A logical link should be established between a therapeutic decision which may affect the patient's functional status and the criteria involving observation. For example, the therapeutic usefulness of observing for signs of raised intracranial pressure is that with early detection a known effective procedure can be carried out to relieve the pressure which

can, otherwise, cause seizures and possible brain damage (39, 72).

Similarly, before a nursing function is included in the criteria involving management, evidence that it is of benefit to the patient should be available. This evidence can be from the result of a clinical trial, from pediatric textbook or from "conventional wisdom." Again, an example to illustrate this: Naso-gastric feeding may be selected as a nursing decision to get fluid and nutrient into a baby that has frequent convulsions. Clinical practice has shown that if the baby convulses while having food orally, a high risk of his inhaling the food and ending up with respiratory arrest exists. Naso-gastric feeding, on the other hand, reduces this risk and provides the required calories, fluids and electrolytes.

Each criteria set will be scrutinized to ensure they satisfy the methodologic requirements described in Section 6.1.1. An external advisory group will independently review each criteria developed by the panel for clinical importance, credibility and comprehensiveness. The pooled result from the criteria setting and review groups will form the final evaluative tool.

##### 5. Pretesting of Criteria

Unless the criteria can discriminate among varying levels of nursing care, they are not sensitive measures of nursing process and of no utility in measuring the effect of an educational programme.

Sensitivity of the criteria will be established by carrying out a pre-test on a group of nurses similar to the ones to be studied. If deficiencies are demonstrated between current practice and the set standard, then there is room for change.

## 6.2 DATA COLLECTION

### 6.2.1 Process Variables and Overview of Measurements

The previous sections have described the identification and criteria for assessment of the pathophysiological states of interest in infants who suffer from measles, tetanus and meningitis. These conditions are listed in Section 5.2.1, and one example of these has been transformed into criteria which indicate the appropriate actions to be taken in the management of infants with this pathophysiological state.

The measurement strategies will consist of:

#### (i) Direct Observation

This will be the main source of data since it is a more reliable method that gives information on actual performance. A structured observational method will be adopted since the observers already know what aspects of the nurses' activities are relevant for the research purpose. The advantages and disadvantages of this method of data collection are well documented in the research literature (83). The major problem in this method of data collection is that the evaluation may be flavoured with the perceptions of the observer. However, this bias will be

minimized in the structured model of direct observation chosen for this study. Even with this structured model, the presence of the observers in the nurses' working environment may produce a reactive (Hawthorne) effect. Their responses can therefore not be totally attributed to the effect of the planned intervention. Another disadvantage of direct observation is that it takes time and money. If all the nursing behaviours are to be observed for all the pathophysiological states, it would mean having to employ observers who will have to work every shift that the nurses work for as long as the data collection period lasts. This can be a very expensive venture and funding for the study might not be approved easily.

#### (ii) Patients' Records

On the occasions when the observers will be off the units they will rely mainly for their process data on what the nurses record in the patients' charts about the care that had been given and patients' responses to the care given. The investigation realizes the limitations of information obtained from patients' records. Some studies have shown that what is recorded in the charts does not always reflect the care actually given (25, 33). Details of the method of abstracting information from these records is discussed later in this thesis.

#### Relationship of the Observers and the Observed

Good research tools and enthusiastic investigators are not the only ingredients necessary for a successful evaluation study. In fact,

with all good will among various workers in the research team, evaluation study can die even before it has a chance to justify its existence if the people to be investigated have no faith in the investigators. Good relationship between the two camps is a sine qua non in the proposed study. The observers will visit the hospitals where they are to carry out observations and chart reviewing. They will spend time with the nursing staff and establish good rapport before actual data collection begins. People seem to get used to observers if the observers do not pose a threat. Deutch observed that the effects of the observer erodes over time and thereby produce a selective contaminant in observational data series. Observations towards the end of an observation session is likely to produce more valid data.

Except for the use of special abstraction forms by the observers, the practice organization of the hospitals and the wards will not be interfered with. This should minimize reactive behaviours by the nurses. Nursing recording charts and procedures will continue as normal. Fewer disruptions in the usual practice should enhance cooperation from the hospital wards being studied.

The observers will be "blind" as to which hospitals are in the experimental or control groups. They will only record the presence or absence of the particular nursing content stated in the criteria list. This method provides standardization for all the observers and eliminates errors that could be introduced by the observers because of the distortion of their perceptions by their own values.

Observers will be non-participant registered nurses but will carry out observations and chart abstraction during the normal day and night shifts in the hospital. They will have to work the same shifts as the nurses in the hospitals that they are studying since a time period during which the activities of interest will occur cannot be sampled. This is not possible in this type of situation where the infants can develop or be admitted with the diseases of interest at any time during the day and night. It will probably be difficult to attract observers who would be willing to work night shifts only, but with extra fringe benefits the three will rotate through day and night shifts so that the nurses who are on night duty can also be observed.

The number of infants with the diseases of interest may not exceed four in any one week in one ward, and usually each hospital has only one of such pediatric wards. Therefore, in a ward with four of these infants, it is estimated that three observers rotating through day and night shifts working five days a week will be adequate for each hospital. There will be an extra one trained as reserve in case any of the regular ones for any reason is unable to continue.

#### Training of Observers

The ideal training approach would be to have all the observers observe the nurses take care of infants with all the indicator conditions and then compare their recordings for inter observer reliability. However, this approach will not be practicable because there is no

guarantee that infants with these indicator conditions will be available in the wards within a short period of time. It might therefore take a considerable length of time to have the observers trained to observe all the indicator conditions. An alternative method which is the use of videotape will be the practical training approach. Nurses will be made to act out the care of patients with the indicator conditions of interest. This will be videotaped and the observers will record their observations using the special observation form provided for the study as these are played back. These recordings will be examined and clarifications made where necessary. This procedure will be repeated until an inter observer reliability score of .75 (Kappa) is obtained for each indicator condition (28).

Why should observers be used?

It is no doubt a tedious task to train observers and also a more expensive approach than the use of patients' records as the data source. That notwithstanding, using direct observation as the main data source is considered a better data source for this type of evaluation study. Patients' records are not suitable because the records may vary from hospital to hospital. Some may have structured forms from which the research staff can check off the activities of research interest; others may be too complex and generalized to be used for monitoring purposes. In order to obtain reliable data the research staff may have to provide standardized protocols or check lists for monitoring purposes. These may become rather burdensome to the nurses; cooperation

becomes limited and the quality of the resulting data then becomes useless for evaluation purposes. Care provided may be intentionally or unintentionally exaggerated in an attempt to maintain appearances of efficiency and responsibility.

The nurses being observed will be randomly assigned to the three observers each day so that the observer knows that whichever nurse is assigned to her that day has the priority of being observed over the other nurses. It is only when that nurse is not involved in any activities of research interest that the observer can give attention to another nurse. This way one nurse can be followed through by the same observer during any given shift. This randomization process also gives each nurse equal chance of being observed by all the observers. The biased observation that may arise by one observer becoming too attached and used to one nurse is eliminated.

#### Training of abstractors

For inter reliability agreement all observers will code one and the same 5 episodes of the indicator condition and then compare and discuss the results. If there is a high degree of agreement they will go on and code 5 new episodes for this indicator condition and then a Kappa correlation coefficient will be calculated for inter rater reliability. If there is low agreement in the first step, this step will be repeated with the next episodes of the same indicator condition until agreement occurs. If a Kappa score of less than .5 is obtained,

reasons for the discrepant scores will be discussed and retraining carried out. If the score is less than .7, additional practice is indicated. When a Kappa score of .70 - 1.00 is obtained the same steps will be carried out for the other 5 indicator conditions. For the intra reliability agreement each observer will do 3 episodes of each of the 6 indicator conditions. An intra-rater reliability coefficient based on 18 observations will be calculated for each abstractor. Inter and intra rater correlation coefficient of .70 will be considered sufficiently high to proceed with the baseline coding.

Three raters will be required in each of the study hospitals and the training will be carried out in one of the reserve hospitals.

#### Use of abstraction and observation forms

The process items will be dichotomized into 'yes' or 'no' responses in the abstraction form. The observation form will have a response column of 'absent' added to it so that the information obtained from direct observation can be compared with what is recorded on the charts. This will help to determine how reliable information obtained from the chart is. The two forms are illustrated. (See Appendix V, VI).

#### 6.2.2 Outcome Variables

##### Justification for selection

The patient outcomes of primary interest in this study are

those related to physical functions and physiologic abnormalities that can affect physical functions; of interest also is survival. Nurses' performance will be evaluated to assess its effect on the following outcomes:

- (i) Control of Seizures
- (ii) Maintenance of Respiratory Function
- (iii) Maintenance of Fluid and Electrolyte Balance
- (iv) Survival

There is general acceptance in medical practice that nursing functions play a significant role in the management of some pathophysiological states where early recognition and prompt communication of findings to the physician can lead to treatment with proven effective procedures (32, 36). The selection is therefore based on the assumption that the prevention or control of these complications are largely within the functions of nursing. They are also selected because they are readily observable, easily accessible, credible and can easily be identified by the nurses. Additionally, these outcome measures are selected because of their specific importance in the three diseases to be studied.

(i) Control of Seizures

An insult to the central nervous system can result in a seizure. Meningitis is an inflammation of the meninges, be it bacterial or viral.

This insult to the brain very often causes seizures which, if not controlled, can be fatal. Even when meningitis is not diagnosed, persistent seizure in an infant may point to some other severe infection and may also be underlying cortical venous thrombosis which might result in cerebral infarction or cerebral damage (72). In most cases these seizures can be reduced by correct and timely administration of prescribed medication. Other than infection, another common insult to the brain that can cause seizures, especially in the 0 - 5-year old group, is high temperature (15, 39). This is an area where nursing can help prevent seizures by maintaining a temperature of below 104°F (40°C) because a temperature as high as that or higher often causes seizures in infants (39). There are effective means of reducing body temperature available to nurses (39).

Intracranial pressure occurs whenever tissue, cerebrospinal fluid or blood increases within the cranium, and this causes irritation to the nervous tissue (39, 72). Raised intra-cranial pressure is one of the complications of meningitis (15, 39, 72). As already observed, if this insult to the brain is not controlled it may lead to seizures. The nurse may not be able to control the pathology of the disease that causes pressure on the brain but she can help control cerebral oedema by preventing overhydration (72). Careful monitoring of the intravenous fluids and recognition of the signs of overhydration are steps in the right direction towards controlling increased intracranial pressure. Additionally, if the nurse recognizes the signs of increased

intra cranial pressure and communicates them promptly to the physician, there are known effective therapy that can be instituted to relieve this symptom.

(ii) Maintenance of Respiratory Function

In measles almost all patients show some evidence of respiratory tract infection. This complication occurs very commonly among mal-nourished children, and in almost all cases is life threatening (60, 72). Relieving nasal obstruction which is a common feature in measles, nursing the child in a sitting position and giving the child oxygen when necessary all make biologic sense in relieving respiratory distress by increasing ventilation of the lungs. Inadequate lung ventilation can lead to hypoxia (39, 72).

An infant that suffers from meningitis is at risk of having seizures. A seizure attack obstructs respiratory function. The nurse has a duty here to maintain respiratory function during a seizure attack. Nursing procedures such as preventing the child from inhaling vomitus or blocking the airway with his tongue are accepted as having credibility in maintaining respiratory function.

Respiratory obstruction is a common feature with tetanus and most deaths from the disease occur as a result of this (72). One of the life saving measures in the relief of this obstruction is a tracheotomy operation and the patient's response to this treatment intervention depends on the nurse's competence in managing the patient during this

phase (72).

Maintenance of respiratory function is a very important outcome in the medical care of infants because there are many other conditions, apart from the three diseases chosen for this study, that very often cause respiratory distress. Conditions such as upper airway disorders, central nervous system disorders, cardiovascular disorders and idiopathic respiratory distress syndrome all make demands on the nurses' skill in maintaining respiratory function (26).

(iii) Maintenance of Fluid and Electrolyte Balance

A child who has measles, especially if there is respiratory distress, is fretful and reluctant to eat or drink (39). A child with meningitis is initially quite ill, including loss of consciousness and, of course, inability to eat or drink. The slightest provocation to a tetanus patient brings on severe spasms, and there is a risk of inhaling food during a spasm attack; feeding is one of such provocations, therefore, oral feeding is usually avoided (39). In all three conditions the patient's fluid and electrolyte balance is threatened. The complications of this physiologic abnormality are well documented in medical textbooks (15, 39, 72). This imbalance can be corrected by administration of naso-gastric or intravenous fluids (15, 39, 72). Although it is not within the scope of nursing practice to institute intravenous infusion, there are signs of dehydration that she can observe and report to the physician who would take action to prevent this

fluid and electrolyte imbalance.

### 6.2.3 Outcome Measurement Strategy

All outcomes will be determined during the period the patients are hospitalized. The time period for assessing outcome is limited to hospitalization period as discussed in Section 8.2. Whilst outcome assessment in a quality of care study should ideally include long term assessment of health status and mortality, it is the recognition of this limitation that led to the selection of these intermediate health outcomes that occur during the acute phase of the disease process, and that are clinically credibly important end points. All charts will be reviewed for the outcome variables.

#### (i) Control of Seizures

The following factors will be analyzed in order to assess their potential contribution to this outcome:

1. Drugs not administered as prescribed
2. Severity of the underlying cause of the seizure
3. Temperature not maintained below 103°F (39°C)

Each chart will be reviewed to determine the control of the seizures.

#### (ii) Maintenance of Respiratory Function

Respiratory function will be measured at the end of the acute phases of the diseases. For measles, if the patient develops pulmonary

complications, the breath sounds, respiratory rate and costal movements at the end of the acute phase (this will vary with individual patient) will be compared with the findings before the complication. Patients admitted with signs of pulmonary complication will be excluded. This difference in the initial state of the patients might confound any outcome results of the nursing care. For the tetanus patients, respiratory function will be measured when spasms cease to occur.

(iii) Maintenance of Fluid and Electrolyte Balance

Normal buccal mucous membrane, smooth, moist and normal tissue elasticity and urine specific gravity of 1.010 to 1.025 will be evidence that this outcome has occurred. Blood will also be tested for electrolyte levels. The pediatrician giving medical care to these infants will carry out the fluid balance assessment on all the infants during the period that the child is unable to take the normal amount of daily intake of fluid orally for any reason.

(iv) Survival

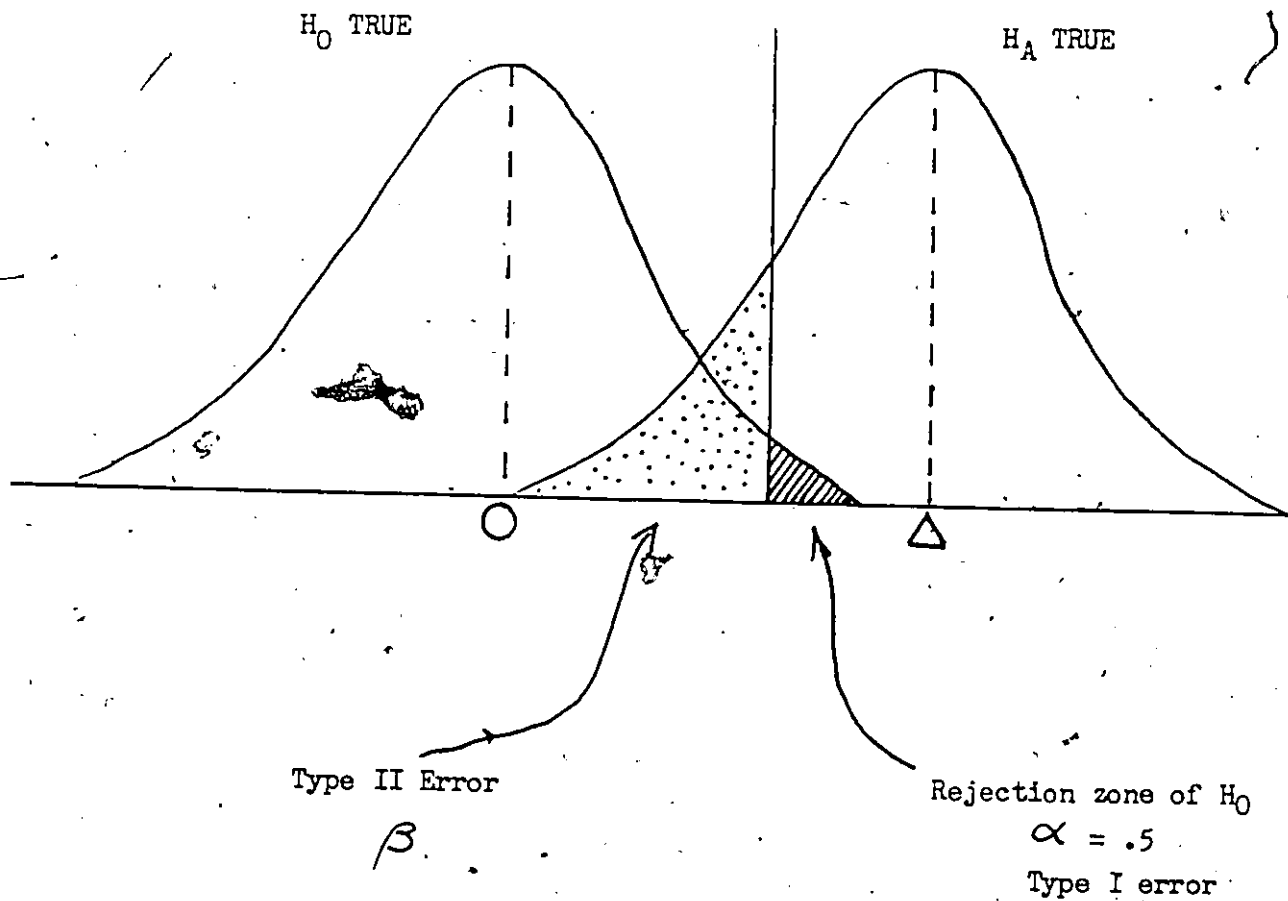
This will be observed from the patient's records while he is still in the hospital.

## CHAPTER 7

### SAMPLE SIZE ESTIMATIONS

#### GENERAL CONSIDERATIONS

In clinical and biological studies where the investigator is interested in showing a difference of what ever variable of interest between the two groups that he is investigating, he states his null hypothesis and conducts a statistical test which may lead him to reject or accept his hypothesis. To arrive at a statistically valid conclusion a decision is taken before the test is conducted as to how great a risk he is willing to take of concluding that there is a difference when in fact there is non (rejecting the null hypothesis). This boundary for the rejection zone is frequently selected as .05, .01, depending on the researcher. This is an area under a normal curve and is designated  $\alpha$ , and sometimes called Type I error. On the other hand, the researcher may fail to conclude that there is a difference when in fact there is; in this case, a  $\beta$  or Type II error is committed. Decreasing one type of error increases the other. Depending on the clinical importance of the variable the researcher is interested in, he/she should choose the size of the significance level,  $\alpha$ , bearing in mind the size of the corresponding chance of  $\beta$  error (24).



To calculate sample sizes large enough to be able to detect a significant difference in behaviour of the nurses and the health outcome of infants with the diseases to be studied, it is necessary to make an assessment of expected baseline levels and degree of improvement in process and outcomes.

#### 7.1 PROCESS

The sample size for the studies of process will be based on the

level of performance the nurses are expected to attain in the post educational test. This level is set at 80% or an increase of 20 points on the mean pre-test score. With these specifications the assumed pre-test score is 60%. This performance level can be regarded as being the same as the percentage of explicit criteria performed for each indicator condition (each test item is constructed to test knowledge about each explicit criteria). Having specified (1) desired level of performance as 80%, (2) present level of performance as 60%, and (3) increase desired as 20%, the following guidelines will be used to calculate the sample size required for each indicator condition:

Let  $P_1$  denote the proportion of the explicit process criteria currently carried out by the nurses.

Let  $P_2$  denote the proportion of the explicit process criteria acceptable as adequate for the management of the indicator conditions.

Decide on the desired increase in the number of process criteria performed.

With a statistical significance for a one-sided  $\alpha$  level of .05 and a one-sided  $\beta$  level of .2 the sample size may be estimated.

Substituting for  $P_1$  and  $P_2$  and the desired increase, sample size can be determined from a sample size table, e.g. Statistical Methods for Rates and Proportions by Fleiss (28), or can be calculated using the formula

$$n = (Z_{\alpha} + Z_{\beta})^2 V / \Delta^2$$

where  $v = 2\bar{p}(1-\bar{p})$

(From Clinical Biostatistics by Feinstein, 1977)

Substituting 60% for  $P_1$  and 20% for desired increase in performance, the number of episodes of illness required for the process studies for each indicator condition is 28 episodes in each group.

## 7.2 OUTCOMES

Since documentation on morbidity factors in these diseases are more easily available in medical textbooks and research reports than mortality, the sample size calculations will be based on these factors. The morbid factors of most clinical importance will be selected for each disease and the largest sample size will be used for the study.

For the outcome studies of infants suffering from measles, pulmonary infection will be used for the calculation of the sample size. This factor is chosen because it occurs in 50% of infants with measles. It is also the cause of high case fatality rate (39, 72).

For the study of tetanus, respiratory obstruction will be used. The main cause of death in patients with tetanus is respiratory arrest and respiratory obstruction occurs in most cases.

Neurological complications occur very frequently in infants

with meningitis; the end organ damage and morbidity that are associated with un-controlled seizures are well documented. Using the rate of occurrence of these morbid conditions and the guidelines used for the calculation of sample size for process studies, the number of patients required for the study in each hospital are:

## MEASLES

$$P_1 = 50\% \quad (50\% \text{ of the patients develop pulmonary complications})$$

$$\text{Reduction required} = 1/2$$

$$\text{Absolute difference} = 25\%$$

$$P_2 = 25\%$$

With  $\alpha .05$ , using the formula given in the previous page a sample of 20 episodes is needed in each group.

## MENINGITIS

$$P_1 = 50\% \quad (50\% \text{ of the patients develop neurological complications})$$

$$\text{Reduction desired} = 1/2$$

$$\text{Absolute difference} = 25\%$$

$$P_2 = 25\%$$

Number required 20 in each group

## TETANUS

$$P_1 = 80\% \quad (80\% \text{ of the patients die of respiratory obstruction})$$

$$\text{Reduction desired} = 1/4$$

$$\text{Absolute difference} = 20\%$$

$$P_2 = 60\%$$

Number of episodes required in each group is 28.

The observed data are likely to differ from the values used for the calculation. At the end of the study the observed proportions and differences and the actual number of the indicator conditions studied will be used to calculate the statistical power ( $1 - \beta$ ) that applies to the results of the evaluation.

As discussed in the earlier section of this chapter, the largest sample size for any of the morbid conditions that are common in the diseases selected for the study will be used for the study. The largest sample size is 56 (28 in each group). Therefore for the outcome studies of infants suffering from measles, meningitis and tetanus a sample of 28 episodes are required for each indicator condition in each group (treatment and control). The overall sample size for the process studies will be 224 episodes for the four indicator conditions. For the outcome studies a total of 136 episodes will be required for both groups.

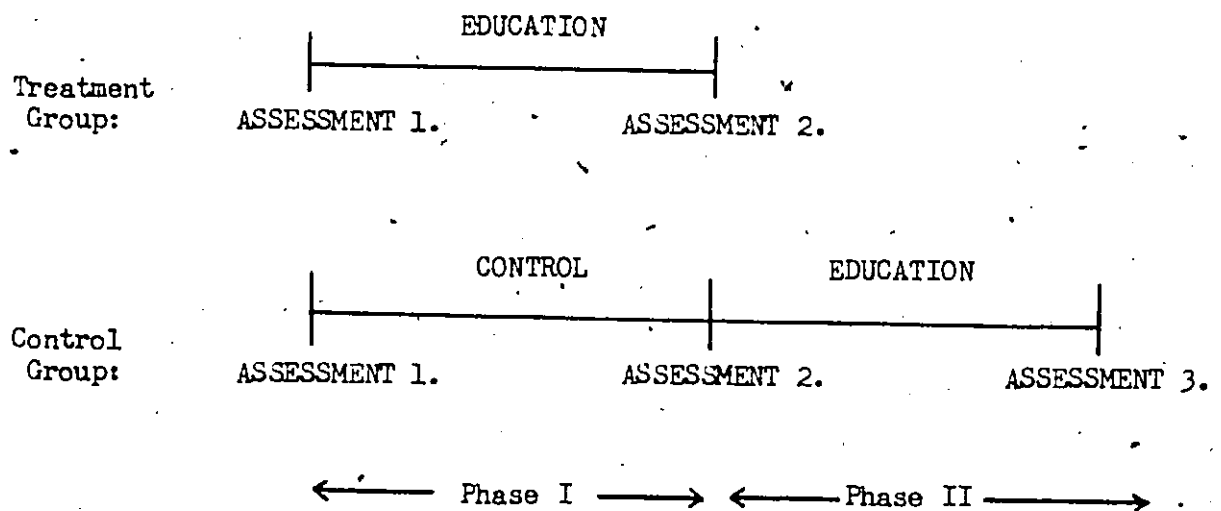
## CHAPTER 8

### ANALYSIS

The main hypothesis in this assessment period is that:

- (1) Nurses' level of knowledge will be higher in the treatment hospitals than in the control hospitals.
- (2) Nurses' behaviour (process) in the treatment hospitals will be better than in the control hospitals.
- (3) Morbidity and mortality rate will be lower in the treatment hospitals than in the control hospitals.

The null hypotheses are that there are no differences in nurses' knowledge level, performance, and morbidity and mortality rates in the treatment and control hospitals.



### Hypothesis (1) Knowledge Gain

This will be assessed by comparing the change scores of the treatment group with those of the control group using analysis of covariance.

Cognitive learning varies in individuals and the variability of scores obtained after an educational intervention has been shown to be strongly associated with pre-intervention scores. Without adjusting the mean score obtained by the nurses to reflect any differences in their initial knowledge level it would not be possible to determine whether or not a significant difference in the pre and post test scores was due solely to the effect of initial difference in knowledge or to the effect of the learning experience provided in the educational programme. For this reason, the data obtained from the change scores will be examined using Analysis of Covariance with pre score as the independent variable (covariate) and post score as the dependent variable.

### Hypothesis (2) Nurse Behaviour (process)

If the nurses' behaviour has changed as a result of the educational intervention it will be reflected in the number of process criteria items appropriately performed in the management of patients after the educational process. The data sources, therefore, for the assessment of behaviour change will be a count of explicit process criteria items performed for the indicator condition of interest. The process items will be equally weighted and they will be scored in a

dichotomized format:

1 Yes

0 No

The number of criteria items performed for each indicator condition will be expressed as a percentage of the total number of essential criteria for that particular indicator condition.

The acceptable level of adequate performance will be set at 80% for each indicator condition. The rationale for setting the goal at this level is because the educational programme that is developed from these explicit criteria will be regarded as having achieved its objectives if the mean post test score is 80% and there has been an increase of about 20 points on the pre test score for each nurse. If the education programme has transfer value, as it is designed to do, the nurses should be able to apply this knowledge in the management of infants with tetanus, meningitis and measles. One patient with any of the three diseases may have more than one indicator condition. The data source, therefore, will be explicit criteria performed for episodes of indicator conditions even though more than one indicator condition may involve the same patient.

Analysis of covariance will be the test statistic applied in order to compare the change in behaviour of the treatment group with that of the control group, for the same reasons as those described in the previous section on knowledge assessment.

### Hypothesis (3) Patient Health Outcome

The patients' health outcome will be examined by category (moderately ill and severely ill) as discussed in Chapter 4. To control for severity of disease a Mantel Haenzel  $\chi^2$  statistic will be used, partitioning by severity of diseases (28).

### Phase 2

The assessment during this period compares knowledge level, performance behaviour and patients' health outcome in the control hospitals, after the same educational programme had been offered to them, with that of the nurses in the main treatment hospitals. The main hypotheses are that the knowledge gain by the nurses and quality of care in the control hospital following the introduction of the same educational intervention are the same as in the main treatment group.

This will be tested on final scores (assessment 2 for treatment and 3 for control) using Analysis of Variance looking at within hospital and across hospital variation, the main effects being between treatment and control groups.

Indicator Conditions	No. of Explicit Criteria	No. Performed	% performed for each indicator condition
1 2 - - - - k			
TOTAL			
TOTAL PERCENTAGE PERFORMED			

The same test statistics used to analyze data on knowledge will be used to analyze the differences in process of care.

## CHAPTER 9

### ETHICAL CONSIDERATIONS

This study is not likely to meet with any major ethical problems. The design of the study is such that there will be no interference with the normal running of the ward. In no stage in the study will care be withheld from the children. In the control hospital, care will remain as usual, and in the treatment hospital, given the hypotheses that the study is designed to test, the standard of care should be better.

It is already existing policy in all hospitals to periodically measure and review nursing performance. It is also a policy to provide in-service education programmes for nurses working in hospitals. The study therefore, in describing nursing in-service programme and observing nursing performance, is in keeping with existing policies. Indeed, this evaluative study would help nursing administrators in deciding how best to plan in-service training programmes for nurses working in other service areas that require special nursing skills.

Informed consent will be obtained from the nurses before participation in the study and they will be free to withdraw from the study without fear that they would be asked to withdraw their services in the hospital. Confidentiality of performance in the educational

programme and in patient care will be assured. The result of the tests and the clinical performance will be communicated to the nurses concerned but not to the nursing administrators.

## CHAPTER 10

### CONCLUSION

In this thesis a randomized controlled trial is designed to test the hypotheses that:

1. In-service continuing nursing education will increase the knowledge of nurses with little previous experience in pediatric critical care nursing in the management of infants who develop pathophysiological states resulting from measles, tetanus and meningitis.
2. Nurses' performance will improve.
3. An application of the knowledge gained during the educational experience in the nursing of critically ill infants will lead to improved health outcome.

The different approaches to quality of care assessment both in medicine and in nursing are examined. The effect of continuing medical and nursing education on knowledge gain, behaviour change and patient health outcome are also discussed in the light of current quality of medical and nursing assessment studies.

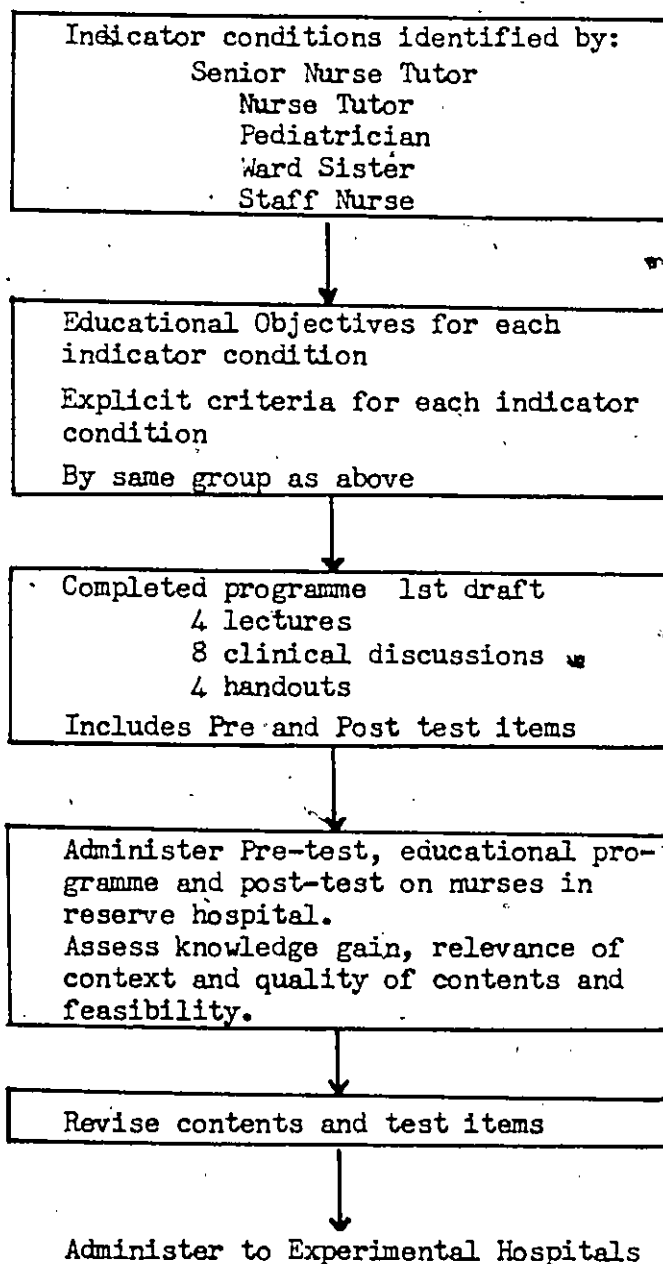
The difficulties encountered by researchers in this field are

highlighted and methodological problems are identified. These include: (1) lack of rigorous experimental design, (2) lack of comprehensive and sensitive process measures, (3) incomplete documentation of activities performed and (4) failure to control for confounding variables.

This thesis also discusses issues in developing valid process measures for quality of care assessment. The steps in the development of a continuing education programme aimed at improving the knowledge of nurses caring for critically ill infants are outlined.

The study proposed is intended to be carried out in Nigeria in order to determine if in-service education will increase knowledge, change nurses' behaviour and improve infants' health outcome.

## Appendix I

FLOW CHART FOR THE DESIGN OF THE  
EDUCATION PROGRAMME

## Appendix II

APPRAISAL QUESTIONNAIRE FOR RELEVANCE OF EDUCATION PROGRAMME

Please answer the following questions to help us determine how you found the contents of the educational unit on Convulsions.

1. How frequently do the nursing problems presented in this educational unit present in your practice?

☐☐☐☐COMMENTS

Infrequent More Infrequently More Frequently Frequently  
than Frequently than Infrequently

2. How appropriate was the level of difficulty in this educational unit for you?

☐☐☐☐COMMENTS

Inappropriate More Inappropriate More Appropriate Appropriate  
than Appropriate than Inappropriate

3. How much new material do you think you have learned from this educational unit?

☐☐☐☐COMMENTS

None

1/2

3/4

All

4. How clear were the test items?

☐☐☐☐COMMENTS

Confusing

More Confusing  
than ClearMore Clear  
than Confusing

Clear

## FLOW CHART FOR RELIABILITY ASSESSMENT

## STEP 1

For the first indicator condition (e.g., Raised Intracranial Pressure) the abstractors do one (the same) episode and then compare/discuss the results.  
Is there a high degree of agreement?

YES

NO

## STEP 1A

Repeat Step 1 with a second (or third, fourth etc.) episode until agreement occurs.

## STEP 2

Observers code 5 new episodes for this first indicator condition (e.g., Raised Intra-cranial Pressure) Rater reliability is calculated using Kappa correlation coefficient.

Kappa Scores achieved:

.49 or less

.50 - .69

.70 - 1.00

## STEP 2A

Retraining: Reasons for discrepant scores are discussed

## STEP 2B

Additional Practice required

## STEP 3

Repeat the foregoing steps with each of 6 indicator conditions

## STEP 4

Each Nurse Abstractor re-does 3 episodes for each of 6 indicator conditions.  
A general Intra-rater reliability coefficient (based on  $N=18$ ) is calculated for each abstractor.

## STEP 5

Start Baseline Survey

## Appendix IV

DESIGN FOR RELIABILITY ASSESSMENT  
NURSE ABSTRACTORS

	1	2	3	TOTAL
1	5 (3)	5 (3)	5 (3)	15
2	5 (3)	5 (3)	5 (3)	15
3	5 (3)	5 (3)	5 (3)	15
4	5 (3)	5 (3)	5 (3)	15
5	5 (3)	5 (3)	5 (3)	15
6	5 (3)	5 (3)	5 (3)	15

TOTAL      30      30      30  
              (18)    (18)    (18)

Each Nurse Abstractor Codes: Inter-rater reliability:

$$6 \times 5 = 30 \text{ codes}$$

Intra-rater reliability:

$$6 \times 3 = 18 \text{ episodes}$$

---

TOTAL      48 episodes

By courtesy Dr. J.C. Sibley

## Appendix V

## SAMPLE OBSERVATION FORM

Name of Patient:

Medical Diagnosis:

Age on admission:

Sex:

Date of admission:

Date of discharge:

Date of Observation

Name of Observer:

YES	NO	ABSENT	INDICATOR CONDITION	EXPLICIT PROCESS CRITERIA

LEGEND: YES = Item performed

NO = Item not performed

ABSENT = Item absent in chart

## Appendix VI

## SAMPLE ABSTRACTION FORM

Name of Patient:

Medical Diagnosis:

Age on admission:

Sex:

Date of admission:

Date of Abstraction:

Abstractor:

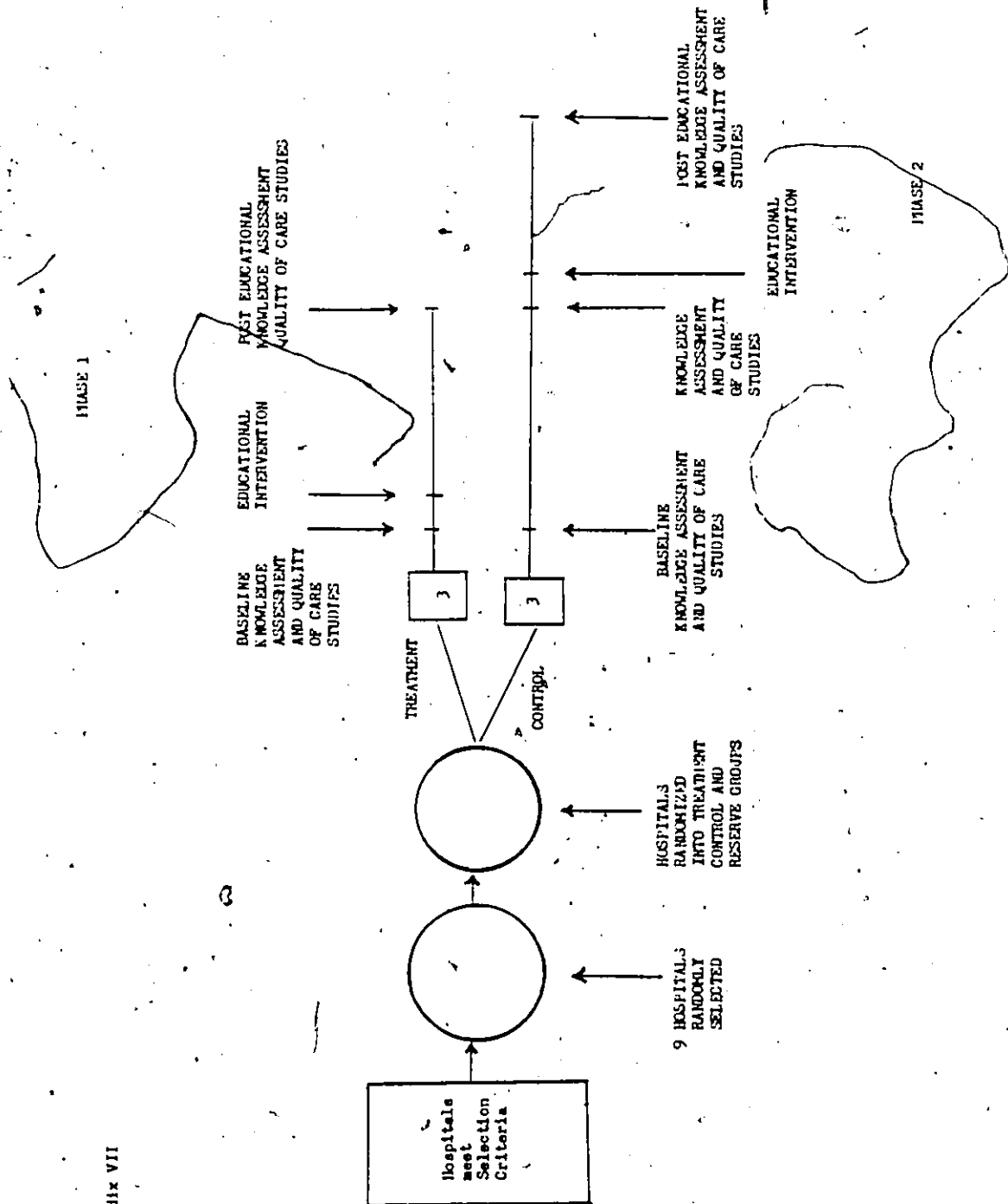
LEGEND: Yes = Item recorded

No = Item not recorded

1. YES NO	INDICATOR CONDITIONS	EXPLICIT PROCESS CRITERIA

# Flow Chart of Research Design

Appendix VII



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