

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

An action research design was embarked upon, utilizing both qualitative and quantitative approaches to address the research question. Following a review of the literature this research methodology was chosen for the purpose of exploring and describing the role of the emergency nurse in the pre-hospital environment and emergency room. The research was contextual and undertaken within the researcher's own meta-theoretical framework, with specific political and ethical considerations.

Consensus data regarding the roles of the emergency nurse were collected which were verified and subjected to subjective pair-wise comparative weighting. Judgment Matrix Modeling using a General Linear Model was calculated to develop a rating scale from the comparative weighting for all the identified roles. A competency rating was also calculated. Descriptive and inferential testing was completed. All the data were analysed with the assistance of a statistician.

This chapter describes the research design and method, the four-phased action research design and analysis procedures. Detailed descriptions of the instrument, as well as issues of reliability and validity, are presented. The chapter further elucidates the results of the pilot study and outlines specific ethical considerations.

3.2 Purpose and Objectives of the Study

For consistency purposes, the purpose of the research is repeated:

This study aimed to explore and describe the role of the South African emergency nurse in the pre-hospital environment and the emergency room in order to develop guidelines for education of this nurse and to influence the development of an appropriate Scope of Professional Practice.

The purpose was achieved through the following objectives:

- to explore and describe the role of the emergency nurse in the pre-hospital environment;
- to explore and describe the role of the emergency nurse in the emergency room;
- to formulate an instrument that can be used for policy formation, education, training and evaluation.

3.3 Research Design and Method

A qualitative and quantitative approach was utilized to investigate the role of the emergency nurse within the pre-hospital environment and the emergency room, by means of an action research design, which involved an exploratory, descriptive, contextual four-phase study. This design was chosen because it aims to solve a relevant clinical and educational problem within a given context, through the collaborative participation and democratic inquiry of the professional researcher and stakeholders. It meets the criteria as stated by Hart & Bond (Badger, 200:203). These are that it must be educative, deal with individuals as part of a social group, be problem focused, contextual, future-orientated, involve change intervention, aimed at improvement and involvement, linking research action and improvement in a cyclical process and founding the research relationship on participation in change. These criteria were met as shown in **Table 3.1 below**.

Table 3.1: Criteria for action research and its application

Criteria	Application in research
Educative	In this study the research process is educative for all participants. One reason for the research was to improve educational practices through role clarification of the specialist nurse. This will be used to educate all other relevant persons so that the working environment and collaborative functions are improved.
Deal with individuals as part of a social group	Emergency nurses belong to a specific nursing specialty. Therefore, it is contextual and the problem is specific to this group.
Problem focused	Lack of clarity of the role of the emergency nurse and inadequate legislative and educational support has created problems with how and where this nurse can practice. Therefore, it is a problem being experienced.
Future-orientated, involve change intervention	Clarity could lead to changes in perceptions, education and possibly, legislation.
Aimed at improvement and involvement	Aimed at better understanding and improvement in practice. The population of emergency nurses were involved and the results could influence their practice
Linking research action and improvement in a cyclical process	The four-phased approach was a cyclical process, where the last phase was dependent on all the preceding phases to enhance clarity and develop instruments for change in practice.
Founding the research relationship on participation in change	The researcher, experts and rest of the emergency nurse population are involved in a collaborative relationship during the research to bring about change. Emergency nurses will utilize the results of the research to motivate for, and effect a change in practice.

Through the integration of theory and praxis emergency nurses seek to improve the rationality and justice of their clinical and educational practices. They need to seek solutions for their own social order and resultant self-determination. A combination of both qualitative and quantitative research approaches was utilized to obtain a rich and more

comprehensive picture of the problem being studied and for validation of the findings (Denzin & Lincoln, 2000:96). In this way the participants who had identified the problems could collaborate in finding a solution to their problems and improve emergency nursing service.

In the following subsections the researcher will describe the concepts of qualitative and quantitative approaches, action research, exploratory, descriptive, contextual and **four-phase** study.

3.3.1 Qualitative and quantitative methods

Traditionally the data from each of the above have been seen as incommensurable, as each is derived from methodology based on a different philosophical framework. However, the multifarious nature of nursing, and the challenges faced needed to be reflected in research in this field. The use of a combination of qualitative and quantitative approaches is becoming more common (Foss & Ellefsen, 2002:242). Through a quantitative approach measurable aspects of human behaviour can be focused upon (Brink, 1996:12) whilst depth can be achieved through qualitative enquiry, where multifaceted understanding, interpretation and insight can be obtained to give meaning to phenomena that remain contextual. Qualitative data was gathered (during phase 1 and phase 3) through a process of reflection and analysis of concepts, which added richness and clarity to the data that was collected. Moreover a combination of quantitative and qualitative approaches can be used successfully to make the results more meaningful (Denzin & Lincoln, 2000:96).

3.3.2 Action research

Action research is an informal, formative, subjective, interpretive, reflective and experiential model of enquiry (Gabel, 1995:1), which utilizes democratic processes for the development of practical knowledge (Joyce, 2005:77). Through collective, self-reflective inquiry the participants improve the rationality and understanding of their practice (Badger, 2000: 202). According to Denzin & Lincoln (2000:96), action research is a process where researchers and participants, through collaborative enquiry, co-generate knowledge which leads to social action and/or the construction of new meaning.

The diverse experiences and capacity of this group enriches the research process to produce valid and meaningful results. Both researcher and participants collaboratively bring what they know best to the process. The researcher brings relevant knowledge regarding research methodologies and praxis and the participants bring knowledge and experience of the problems being researched to the process. Action research is based on the premise that both role players are essential to co-generating new knowledge. As the problem is common to the group, their urgency and focus is enhanced, thereby making them a formidable team.

According to Stinger, action research is characterized by repeated cycles of information gathering, exploration, analysis and interpretation of data, then planning, implementing and evaluating (Badger, 2000:203). It begins with the identification of the problem, followed by focusing on the specific questions that need to be answered. These guide the literature review and expertise that needs to be involved for data collection. The data are objectively reflected upon and analyzed to determine the action required to correct the problem (Zerillo, 2004:1). The researcher and other emergency nurse experts identified the problem

and together through different phases reflected upon and analyzed it. Through clarification of this emergency nurses' roles, knowledge was co-generated to be used for appropriate improved educational and clinical practices.

The validity of this process is demonstrated through the ability to bring about change that is workable. This is achieved through the contextual, holistic knowledge that is co-generated by all the participants. The results of the research are valid only within a specific context and generalizations cannot be made, as it is aimed at solving a problem within a specific situation/context. The credibility, validity and reliability can be measured by the willingness of the stakeholders to act on the findings that they co-generated.

The additional value of this type of research is that participatory (by colleagues and other stakeholders) evaluation can be incorporated to make it more meaningful. External stakeholders are amongst those who can contribute to the knowledge generation so the process is not autopoietic. This, according to Denzin & Lincoln (2000:104), describes the self-referential and self-generating form of judging of standards by small groups of interdependent individuals without regard to the contextual and societal interests. The research then shows clear social relevance and intellectual capacity building and diverts from the traditional socially passive research.

3.3.3 Exploratory

This design was used to explore the dimensions and characteristics of the role of the emergency nurse to provide insight into the characteristics and variables of the identified phenomenon. It is contextual and required for the development of conceptual and operational definitions and descriptions of the variables. This design leads to an

interpretation of theoretical meaning and provides knowledge of the variables being studied including the study population. It can lead to the identification of problems in practice as well as theory development.

Through the linking of conceptual and operational definitions of the variables, correct sampling selection, use of valid and reliable instruments and environmental control during data collection bias can be limited (Burns & Grove, 2001:248), leading to information that is valid and reliable. A literature review was done to explore all the relevant variables together with the expert focus group, whose expertise was used to explore it in a more contextual manner. Thus the purpose to explore and clarify the meaning and nature of the research topic from the research participants' perspectives could be achieved.

The relevance and reliability of the expert focus group's findings were further explored by sending a questionnaire to the rest of the population for comment.

3.3.4 Descriptive

How knowledge is gained, organized and interpreted is relevant to the claims made (Denzin & Lincoln, 1994:212). A descriptive study was undertaken as the intention was to gain more information about the phenomenon being studied, to obtain a clearer picture of the field of study, which would justify current practice or changes in practice. Descriptive studies allow judgments to be made dependent on what others are doing in similar situations, thus justifying theory and practice (Burns & Grove, 2001:248). The study population, variables and relationships can be studied to gain an overall view of the phenomenon being studied. Throughout Phase One, Phase Two and Phase Three, descriptive information were elicited from the study participants from whom clarification of the roles of the emergency nurse could be developed.

3.3.5 Contextual

This study is contextual as it pertains to a specific group, of emergency nurses within the boundaries of specialist emergency nursing (SANC Reg. 212). The groups' theory and practice has its own assumptions, values and beliefs that characterize the profession and define its boundaries (Standards Generating body, 2003:n.p.). Although these may overlap into other health professionals' territories, a significant amount remains their own. This is significant as the findings will therefore not be generalizable which is problematic for positivists (Denzin & Lincoln, 1994:487). However Greenwood said that although situations differ and have unique aspects, through construction of theory some findings may be generalized to other situations (Badger, 2000:204).

The researcher is part of the setting, context and culture being investigated (Denzin & Lincoln, 1994:486) and has definite views about the theory and practice of the emergency nursing as a speciality. The researcher as an insider action researcher may be problematic if not enough probing is done (Joyce, 2005:76). Therefore the inclusion of Phase Three to give the wider population an opportunity to add to the identified roles and prevent bias. The study being conducted is for the benefit of emergency nursing through changes in preparation for and implementation of practice.

3.3.6 Four-phase study

The research process involved **four interrelated phases**. An overview of the research process is provided in **Figure 3.1** thereafter a more detailed explanation of each phase will be provided:

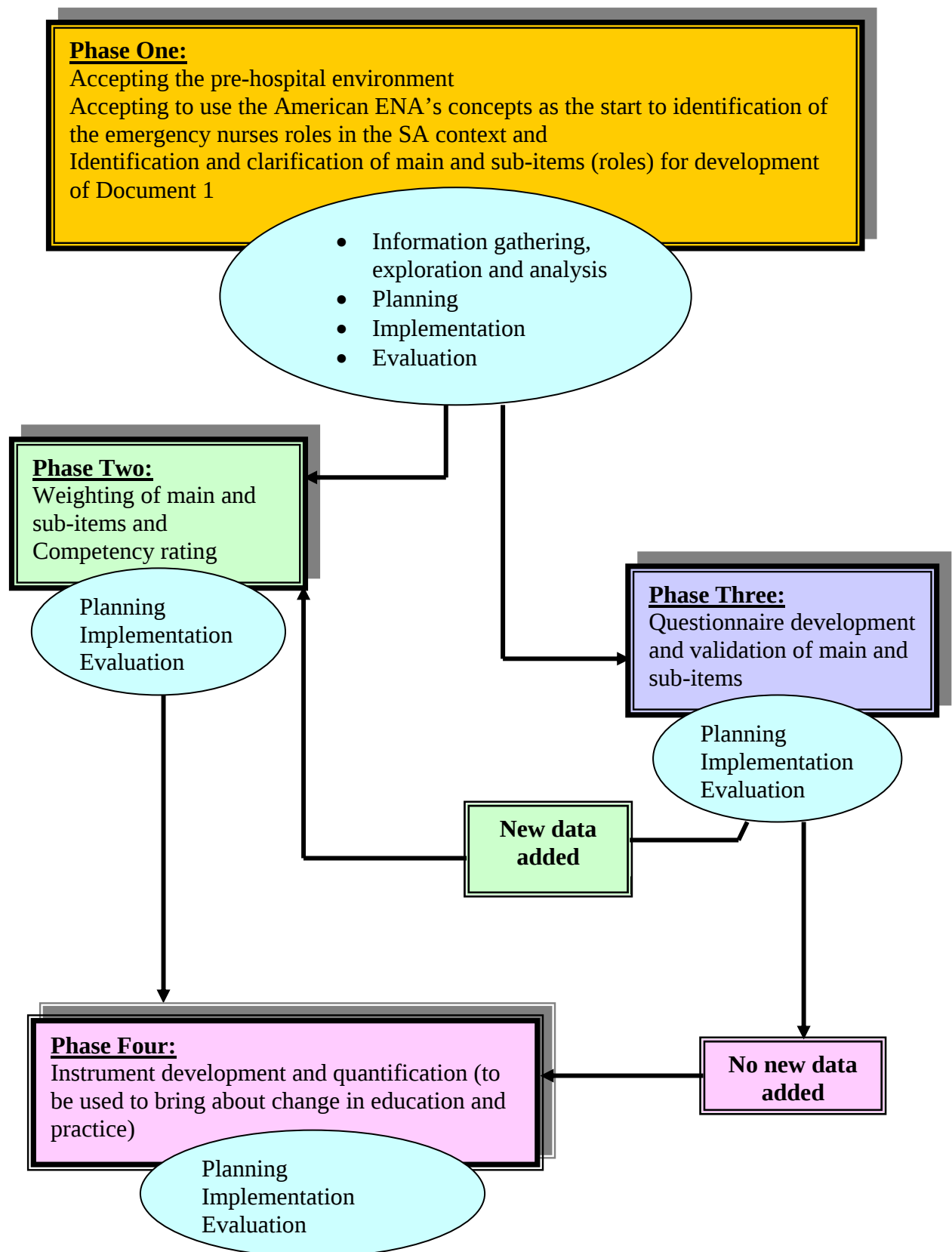


Figure 3.1: Flowchart of the four-phased study

3.3.6.1 Phase One: Expert focus group interview (role clarification)

A focus group interview was held. This is a qualitative data gathering technique where the respondents are brought together as a discussion and resource group and where the interviewer directs the interaction between the respondents in a structured, semi-structured or unstructured manner. According to Morse (1994:225), it enables the researcher to gain insight into the beliefs and attitudes that underlie behavior. The data gathered is enriched through dynamic, interactive, collaborative participation as members share their experiences, beliefs, perceptions and attitudes especially when complex issues and varying levels of experience are involved.

A group interview is more flexible, stimulating to the participants and can provide cumulative and elaborative information over and above that of individual responses (Denzin & Lincoln, 1994:365). It involves the characteristics of qualitative research where discussion leads to shared interpretation, meaning, understanding and acceptance of concepts. A limitation noted in Morse (1994:238) is that this is not a consensus building technique as the group dynamics could impact on individual opinions and contributions. However, the author also mentioned that some do allow for consensus building.

A semi-structured expert focus group interview was undertaken which gave the expert emergency nurses an opportunity to critically analyse each concept, to achieve shared meaning and understanding and then to reach consensus on each role. Thus the purpose to explore and clarify the meaning of each role could be achieved from the study participants' perspectives. The data confirmed at the end of this phase is noted as **Document 1** (Table 4.2).

3.3.6.2 Phase Two: Weighting of main-items, sub-items and competency rating

According to Crawford & Williams (1985:389) the study of interactions among various levels of a hierarchy depends on the assessments of ranked importance of objects at each level relative to objects in the level above, where the building blocks are the ratio scales measuring the relative importance of objects at a given level. This subjective Judgment Matrix model was used to weight the relative importance of the entire main and sub-items identified by the expert focus group for both the pre-hospital environment and the emergency room.

This took place during the second day of the expert focus group interview. Each expert had to do a comparative pair-wise weighting of each main and sub-item (Annexure C and D) on a VAS that was used to develop the evaluation instrument during **Phase Four**. Each expert also did a competency rating thorough the use of a VAS that was also employed to develop the evaluation instrument. Plans were made for a possible repetition of this phase that depended on the data analysis in **Phase Three**. If new main or sub-items had to be included to the data identified during **Phase One (Document 1, Table 4.2)**, then all the comparative weighting would have had to be redone.

3.3.6.3 Phase Three: Testing, validation and verification of Document 1

Document 1 (Table 4.2), developed during Phase One was used to develop a questionnaire (Annexure E) that consisted of both closed and open-ended questions. The intention was to validate and/or change or reject the roles identified during **Phase One** (Table 4.2). The

participants were asked to agree or disagree with the data included in Document 1 (Table 4.2). They were also asked to add any other roles they felt were relevant and not included. This process required the respondents to reflect and think critically in order to either agree or disagree with the identified roles and then to add other roles where necessary. Therefore, they needed some experience as specialist emergency nurses. This phase was essential in providing sense-related data that could promote the reliability of the findings as an indicator of validity (Denzin & Lincoln, 1994: 487).

3.3.6.4 Phase Four :Instrument development

Document 1 (Table 4.2), developed by the expert focus group during **Phase One** was accepted, after analysis of data received during **Phase Three** indicated that no new data had been identified. Using the results of the comparative weighting (Annexure C and D) done of all the data in this document and the competency rating (Table 4.6) during **Phase Two**, instruments were developed that could be used to influence policy formation for emergency nurses and for education, training and evaluation of the emergency nurse.

In this study the four-phases were implemented in the following manner.

3.4 Phase One: Expert Focus Group Interview (Role Clarification)

3.4.1 Research Setting

A focus group interview was held on the 3rd and 4th November 2003 in the Department of Nursing Education of the University of the Witwatersrand Health Sciences Faculty in Johannesburg where there are facilities for small group discussions. On the first day the researcher who facilitated the workshop introduced the research. Introductions were made

to establish a non-threatening environment where the group members could interact comfortably. The conference room comfortably accommodated the fifteen people, also creating an environment for close communication but not a stifling one. Access was available to two other rooms where sub-groups could work without fear of disturbing or influencing any of the other sub-groups. It allowed them the space for arguing their points quite vociferously, which they did. Seating arrangements in the conference room were circular so the group members could see one another. This facilitated good communication with one another as well as with the person who guided the interview. The person who acted as the secretary was on the premises, which allowed for typing of the documents as information became available. This meant that the group could confirm the agreed upon data by the end of the first day, to meet the objective set for that day. Consent was obtained telephonically from each expert emergency nurse prior to the workshop, followed by written consent was obtained during the workshop.

3.4.2 Target population

Expert emergency nurses who were practicing in South Africa were the target population. The diverse knowledge, experiences and capacity of the group enriched the research process to produce valid and meaningful results. The researcher and participants collaboratively brought what they knew best to the process.

3.4.3 Eligibility criteria for the expert focus group

Registered or certified emergency nurses who were experts in the field of emergency nursing and/or emergency nursing education had to have a minimum of three years' experience in emergency nursing, with a minimum of two years' experience in formal education and/or clinical facilitation in this field.

3.4.4 Sample and sampling method

A focus group comprising nine (n = 9) registered nurses who were registered or certified with the SANC in Trauma and Emergency nursing and had been involved with training in this field, recognized expert nurses in this field, was purposively selected. This was necessary to obtain valid, credible and reliable information regarding the phenomenon being studied.

Purposively selected expert emergency nurses from Gauteng, Western Cape and Kwa-Zulu Natal were included in the expert focus group interview. Two expert emergency nurses in the Free State were unavailable. One expert emergency nurse from the Free State was interviewed regarding the role of the emergency nurse, but the information received was not included as it was unstructured and unplanned. Attempts to include two other specialists from the Western Cape were unsuccessful as they were unavailable for the period that was acceptable to the majority of the group. The experts were selected from provinces that are actively involved in education and training of emergency nurses. **Table 3.2** below is a synopsis of the demographic data of the expert group. The participants have each been given a code number from 1 – 9. The data obtained indicates the level of expertise of this group both in education and clinical experience. The following information was requested from the focus group:

- **Their age group**
- **Their academic qualifications**
- **The year they qualified as an emergency nurse**
- **Their years of experience in emergency education**
- **Their years of experience practicing as an emergency nurse (excluding formal education)**

Table 3.2: Demographic data of the expert focus group

Demographic Items	Participants (n = 9)								
	1	2	3	4	5	6	7	8	9
Age	30 - 39	40 - 49	30-39	30-39	50-60	30-39	30-39	50-60	40-50
Academic Qualifications									
	RM, RN, Psych, Com	RN.RM	B.Soc Sc (Nursing)	RM, RN, Psych, Com	RN.RM. Psych	B.Soc Sc (Nursing)	RN.RM. Psych, Com	RN, RM,	RN, RM
	Dip in T&E	Dip in T&E	Cert T&E	Dip in T&E	BAA	B CUR (AD & ED	Dip in T&E	Cert T&E	Cert & Dip in T&E,
	BA Ed & Ad	B CUR Ed & Ad	AEA	BAA	B CUR I et A	Crit Care & Trauma	Nurse Education	Dip in ED	Crit Care
	BAA	Aviation Medicine	BATLS BARTS	BA (Soc, Pysc)	Dip Occup Health			Dip Com	Dip in Paediatrics
	BATLS & BARTS	BAA	Instructor	Cert Med Law	MA (CUR)			BA (CUR) BA Hons	Aviation medicine
	Instructor	AEA			D Litt et Phil			Dip in OT	
Year Qualified as an Emergency Nurse									
	1992	1989	1998	2002		2000	1997	1984	1990
Years Experience in Emergency Education									
Clinical	8	5	6	2	5	4	3	3	13
Formal	7	6		1	15	4	3	20	13
Other	BATLS	EMS 7 years	BATLS BARTS	M CUR in trauma 3 years					Emergency paediatrics and paramedics
	BLS for 1 year		ALS for 2 years	In hospitals For 5 years					
Years of Experience Practising as an Emergency Nurse									
In hospital	4	11	2	5	10	1	6	2	10
Pre-hospital	few sessions between 1990 - 1996	7	3	3yrs as part-time volunteer	9 as volunteer	0	0	6 months	3

3.4.5 Data collection

A semi-structured focus group interview was held with a group of experts to obtain consensus data on the expected roles of emergency nurses. The researcher was the facilitator of the workshop. This method was chosen as data collected in this way are enriched through group interaction and individual participation can also be enhanced in a group setting (Morse, 1994:225). This method is ideal for the exploration of health care related issues.

Introductions were made to establish a non-threatening environment where the study participants could interact comfortably. Ground rules were established and the process to be followed was explained. All the equipment and stationery required was prepared beforehand, so the group could start working immediately and unhindered. The topic being researched was of concern to all present and since it had been introduced to them beforehand, when they were requested to be a part of the expert focus group. A common goal was identified before commencement of Phase One. The interview was guided by the research objectives as follows:

The **first step** for the expert focus group interview was to establish whether the group accepted in principle that the environment in which the emergency nurse should practise included the pre-hospital and emergency room as part of the emergency care cycle (milieu). This was accepted.

The **second step** was the use the concepts taken from the American ENA's Scope of Practice as a starting point. This required some discussion and the group agreed.

The **third step** was the analysis, clarification and confirmation of the main items. The group was divided into three subgroups of three each and separated into three different rooms for discussion regarding the main items. The sub-groups came together and after presentation and discussion of each group's findings they reached consensus regarding the **main-items**.

The **fourth step** for the workshop was the identification and clarification of the **sub-items** (roles). The process of dividing into sub-groups to discuss each of the main-items in order to identify and clarify the sub-items was repeated for each main-item. The subgroups met and discussed their findings until consensus was reached regarding each sub-item. This was written on a flip chart for visual confirmation. The information was given to the secretary, who was on the premises for typing of the data agreed on. At the end of the day the members had a document in hand, which could be evaluated and confirmed as a true reflection of their decisions. On the second day of the expert focus group interview the document was given to all the members once again for confirmation and corrections. This was done as consideration was given to the possibility that changes might need to be made, as a result of overnight deliberations. All the items and sub-items were re-evaluated, corrections were made and were confirmed. **This was noted as Document 1** (Table 4.2).

3.4.6 Validity and reliability

Construct and content validity was obtained through a literature review regarding the constructs and phenomenon being studied. Statistical testing during Phase Three validated the roles of the emergency nurse as identified by the expert focus group. The use of purposively selected experts in the field created an ideal environment for sharing of experiences and knowledge so contextual clarification of the concepts could be

accomplished, increasing the reliability and validity of the data. The process of obtaining group consensus agreement regarding the roles of the emergency nurse within the pre-hospital environment and emergency room entailed critical, reflective and collaborative functioning. This was necessary to obtain valid, credible and reliable information regarding the phenomenon being studied as well as for their contribution as experts to the development of the instrument. The process of action research that involves reflection leads to increased rationality (Badger, 2000:202), hence the use of this method. Reflective thinking provides sense-related data that promotes reliability of the findings, which are an indicator of validity, or the accuracy and truthfulness of the findings (Denzin & Lincoln, 1994:487).

3.4.7 Data analysis

The researcher collected qualitative data with regard to behavioural aspects that impacted on the functioning of the group and on important aspects identified by the group that could impact on the education and practice of the emergency nurse. This allowed for a richer interpretation of the results.

The expert focus group had to reach consensus regarding the roles of the emergency nurse and this did not require data analysis. **Descriptive statistics** were obtained from the development of **Document 1**, which defined the role of the emergency nurse in the pre-hospital environment and the emergency room.

3.5 Phase Two: Weighting of Main-items, Sub-items and Competency

Rating

3.5.1 Research setting

The expert focus group interview of Phase One continued into Phase Two, which took place on the second day at the same venue.

3.5.2 Target population

The same population involved in Phase One were used, as expert opinion of the concepts they had clarified was required.

3.5.3 Sampling and sampling method

The expert focus group of Phase One was the sample group.

3.5.4 Data collection

A semi-structured expert focus group interview was conducted as a continuation of Phase One. This was also based on literature findings. Data elicited during Phase One were utilized to develop visual analogue scales (VAS: Appendices C and D) for each main and sub-item. Temporary visual analogue scales were prepared for main and sub-items at the end of day one of the expert focus group interview in preparation for Phase Two. On day two, after corrections were made to the data collected on day one, the final document was used for a complete collection of visual analogue scales. The statistician explained the process of using the visual analogue scales to the researcher, who in turn explained it to the expert focus group, to guide this process.

If new data had been identified and found relevant, this would have been included during Phase Three and the expert focus group would have had to re-weight the data.

The **first step for Phase Two** was the comparative weighting of the main and sub-items. These final items were displayed on visual analogues so that each individual in the focus group could do a comparative pair-wise weighting of the main-items and sub-items. Twenty eight (28) visual analogue scales (Appendix C) were developed for the main-items and 95 visual analogue scales (Appendix D) for the sub-items. These included sub-items for both the emergency room and the pre-hospital environment. The expert focus group gave a subjective judgemental weighting to the various main-items and sub-items (which they had identified during the interview) to identify the relative importance of each within the hierarchy of items identified. One sub-item i.e. **resources, was removed** as the focus group decided later on that it was generic to all the roles of the emergency nurse. One member could not be present on the second day and was unable to complete the visual analogue scales. Attempts to get the information were problematic and the visual analogue scales were received too late for inclusion in the final data.

According to Crawford & Williams (1985:389), “the study of interactions among various levels of a hierarchy depends on the assessments of ranked importance of objects at each level relative to objects in the level above, where the building blocks are the ratio scales measuring the relative importance of objects at a given level”. According to Crawford & Williams (1985:388), the entities ($Mi_1, Mi_2, \dots, Mi_8$) in this study refer to the main and sub-items, which are in some sense comparable and plan to achieve a common goal and the entities, have varying degrees of some common value. All the items identified were related to the common goal of preparing a competent, safe emergency nurse within the pre-hospital environment and emergency room.

The data required members to estimate the relative importance of one item versus another in a pair-wise linear fashion where item weights W_i were applied by the expert emergency nurses to both the main-items and the sub-items. For example when main-item i (the scientific nursing process) and main-item j (emergency preparedness) were compared, the weights W_i and W_j followed as the distance on the VAS of 100mm (10cm) from zero to the mark on the VAS and the distance from this mark to 10cm, as shown in **Figure 3.2 below**.

1. Scientific nursing process versus emergency preparedness

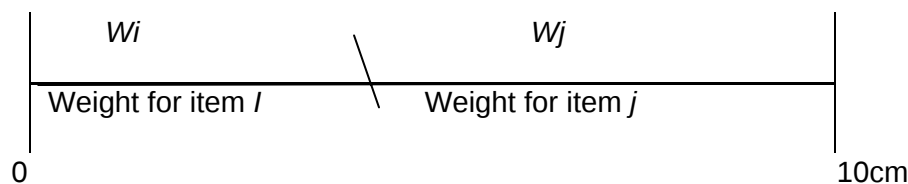


Figure 3.2: Example of how weights were assigned to main-items

In principle these were done in the event that no changes would have to be made to Document 1 (after Phase Three). Plans were put in place to redo all weighting if the VASs' were added to, or if changes were made to Document 1 on completion of **Phase Three**. The focus group was adequately prepared for this eventuality.

The **second step** for **Phase Two** was to obtain a competency rating through the use of a VAS. The intention was for each member of the focus group to do a four/five-point weighting that could lead to a Likert- Scale. This was discussed and the participants decided that this should not be done, as a person was competent, not competent or highly competent. The expert group was requested to make a subjective judgment of competency

Through action research and the inclusion of expert's practical relevance could be obtained (Badger, 2000:204), which is important for improving practice.

Ensuring rigour is linked to reliability and validity, which requires that appropriate information be obtained according to the needs of the study (Denzin & Lincoln, 1994:230). The data collected during this phase were appropriate, as it enabled each role to be weighted differently, as the importance of each role varied in relation to its level of importance. An example is emergency preparedness versus resuscitation.

3.5.6 Data analysis

According to Crawford & Williams (1985:388), the entities ($Mi_1, Mi_2, \dots, Mi_g$) are in some sense comparable and usable to achieve some goal. The entities have varying degrees of some common value. An important application of the ratio scale is in the study of hierarchies where ratio scales for various levels can be combined multiplicatively to give a view of the entire hierarchy. The author states that a ratio scale $(u_1, u_2, \dots, u_n)$, $u_i > 0$, for objects $E_1, E_2, \dots, E_n$ exists but is not known and $a_{ij}, i, j, 1, 2, \dots, n$ are subjective estimates of u_i / u_j made by a judge. It is assumed that $a_{ii} = 1$ for each i , and $a_{ji} = 1/a_{ij}$. The matrix $A = [a_{ij}]$ of subjective pair wise comparisons is called a Judgment Matrix. The judge is usually asked to "supply the $n(n-1)/2$ upper off diagonal terms" (Crawford & Williams, 1985:388). This was achieved through the pair-wise comparative weighting. Quantitative statistical averages were calculated for each pair wise comparative weighting: of the main-items (Annexure F) and sub-items (Annexure G), as well as the competency rating (Table 4.6).

3.6 Phase Three: Testing, Validation and Verification of Document 1

3.6.1 Research setting

During this phase a quantitative, non-experimental, descriptive survey was done. This was to obtain information relevant to the data obtained in Phase One and for validation and verification of the information developed by the expert focus group. The rest of the population of emergency nurses (registered or certified with the SANC as Trauma and emergency nurses), who work in the field of emergency nursing were surveyed as they formed the sample population. Surveys are used to collect data that can be acquired through self-report as it can contribute in a limited way to scientific knowledge as a data collection technique (Burns & Grove, 2001:256).

Questionnaires developed from the findings in Phase One were sent to the residential or postal addresses. Some were hand delivered to accessible members of the sample.

3.6.2 Target population

The population comprised all registered or certified trauma and emergency nurses in South Africa who were practicing in academic hospitals, private clinics, community hospitals, primary health care clinics, occupational health care clinics or ambulance services. These nurses work in the private and public health facilities, independently or with paramedics and/or doctors. There were a total of 426 emergency nurses, of which nine were members of the expert focus group and one was included in the pilot study. The total population to whom the questionnaire was sent was 416 ($N = 416$). Of these, 94 responded (22.6 %). This is less than usual for mailed questionnaires, which according to Burns & Grove (2001:430) is 25-30%. The statistician was consulted with regard to the number of

questionnaires returned and confirmed that it was acceptable owing to the results in detailed in Chapter 4.

Table 3.3: Population and sample size

	Population for the Questionnaire = N	Questionnaires returned = n
Numbers	416	94
Percentage	100	22.59

3.6.3 Eligibility criteria for Phase Three

These nurses had to have successfully completed the Trauma and Emergency Nursing Science certificate or diploma course during/before the first quarter of 2004.

3.6.4 Sampling and sampling method

The complete accessible population who were certified or registered as Trauma and Emergency nurses with the SANC excluding the expert focus group members and one participant involved in the pilot study was utilized. These nurses had to have successfully completed the Trauma and Emergency Nursing Science certificate or diploma course before the first quarter of 2004. The total accessible population was utilized, as the population was relatively small, not all would respond and many emergency nurses not working in the country had to be considered. The statistician was consulted for statistical analysis.

3.6.5 Data collection

Document 1, formulated during Phase One, was utilized to develop a questionnaire that consisted of both open and closed ended questions (Annexure E). A questionnaire based on a Likert Scale was used to elicit whether the participants agreed or disagreed with the data identified by the expert focus group. An option was given to include data that they felt had not been identified by the expert focus group. In this way item validation (of what the experts had identified), could be done by emergency nurses working in the field. The new data (identified under options) would have been included in the final document if found relevant and the focus group would have had to re-weight all the data.

The questionnaire was evaluated and discussed with the statistician in checking for validity and reliability. It was then distributed to the rest of the population by post or hand delivered. Each included a stamped and addressed envelope for the return of the completed questionnaire.

3.6.6 Validity and reliability

The view that sense-related data promote reliability, or the stability of methods and findings which is an indicator of validity, or the accuracy and truthfulness of the findings as related to positivists' views (Denzin & Lincoln, 1994: 487) was used throughout the research. For validation of Document 1 (Table 4.2) that consisted of the main and sub-items developed during Phase One, a questionnaire was sent to the rest of the population. Participants needed to think critically (reflective thought) about their individual and collective roles to make decisions that would lead to sense-related data. From these data it was possible to assess whether the data obtained during Phase One was valid and reliable.

The statistician was consulted, to ensure the validity and reliability of the questionnaire. It was then sent to the population of emergency nurses with a minimum of one year of experience, which meant that they had a minimum of basic theoretical knowledge and practical skills from which to assess the data in the questionnaire and comment. Consistency was maintained in the way in which the questionnaires were administered, as this was important for validity (Burns & Grove, 2001:430).

Repetitive information from multiple sources, in this case the expert group and then the respondents, led to confirming data. The data are linked to reliability and validity, which should include the accounting of differing variables that was understood (Denzin & Lincoln, 1994:230).

3.6.7 Data analysis

Demographic data were collected to provide information regarding age, qualifications and years of experience of the participants. Data were collected to compare the percentage of agreement versus disagreement for each role identified by the expert focus group within the pre-hospital environment and emergency room. All other roles identified by the expert focus group were analysed to see if they corresponded with those already rated. Descriptive and inferential statistics were used to present the data obtained.

3.7 Phase Four: Development of the Instrument

3.7.1 Research design

The document (Table 4.2) developed by the expert focus group during Phase One was accepted after analysis of data received during Phase Three indicated that no new data had

been identified. Together with the results of the comparative weighting done of all the data in this document 1 (Table 4.2) and the competency rating done during Phase Two an instrument was developed. This could be used to influence policy formation for emergency nurses and for education, training and evaluation of emergency nurses. The process required close involvement with the statistician, as most of it was dependent on the statistical evaluation. The data of **Document 1** (Table 4.2) were developed into an instrument to which was attached a three point Likert Scale that was the result of the competency rating done during Phase Two. The instrument without the Likert Scale could be used for policy formation. When the Likert Scale and weighting scales are attached it can be used as an educational guide and an evaluation tool to assess the competency of the emergency nurse within the pre-hospital environment and the emergency room.

The instrument was developed so that the emergency nurse could be evaluated in relation to each separate component (main-item with the particular sub-items) at different periods (formative evaluations) or in totality (all the main-items with their sub-items) as a summative evaluation.

3.7.2 Data collection

The respondents validated document 1 (Table 4.2), developed at the end of Phase One of the expert focus group interview, during Phase Three. Therefore it was unchanged. To develop the final instrument the following were used:

- Document 1 (Table 4.2),
- The results of the comparative weighting: the scaled weights for the main-items and sub-items for the pre-hospital environment and the emergency room (Annexure F and G),

- Competency rating (the 3 point Likert Scale: not competent = 0, competent = 0.72 and highly competent = 1, obtained from the competency rating (Table 4.6).

3.7.3 Validity and reliability

To improve the reliability and validity of data, adequate, appropriate information must be obtained (Denzin & Lincoln, 1994:230). This was achieved through purposeful selection of expert emergency nurses who could give appropriate, reliable data, which was then validated by the respondents. This group because of their knowledge and expertise could give realistic weightings to the data. This was crucial to the development of the instrument for educational and evaluation purposes. An audit trail of the complete process is available, so the process can be replicated if necessary.

The concurrent process of data collection and analysis prevented the collection of unnecessary data, reduced the costs involved and reduce researcher confusion (Denzin & Lincoln, 1994:229). The action research process allowed this concurrent collection of data and analysis of it within the four phases.

3.7.4 Data analysis

Descriptive and quantitative data were required during this phase. A methodology referred to as “Modeling of Human Judgment”, which involved the use of Judgment matrix modeling for main-item and sub-item weights using the general linear model was done. From this, scaled weights were obtained for each of the main-items and for each sub-item, in the pre-hospital environment and emergency room. These scaled weights were used to develop a formula for evaluation of each role. Each role had its own value according to the scaled weights. It is important to note that this method assigns its own-scaled value to each

role, unlike most evaluation instruments that are available, where all the roles are of equal value. Likewise, each main-item had its own scaled value which, when added together, equaled 100%.

3.8 Pilot Study

A pilot study was completed as a trial for the main focus group interview during October 2003. It comprised one (n = 1) expert emergency nurse with whom a semi-structured interview was conducted to test whether the questions asked during the interview were clear enough to elicit the desired responses for the study objectives. The questions and instructions could also have been refined thereafter. As a result of the findings, the questions had to be refined for clarity and elicitation of the correct responses. The results of the pilot study were not included in the results of the main study. The pilot study involved an expert in the field as indicated by the demographic data depicted in **Table 3.4** below.

Table 3.4: Demographic data of the expert for the pilot study (n = 1)

Age group	30-39
Academic qualifications	B Soc Sc (Hons) Nursing Science B Soc Sc (Hons) Critical Care Certificate in Trauma Nursing Diploma in Nursing Education M CUR (clinical)
Year Qualified as Emergency Nurse	1994
Years of experience in emergency education	Clinical: 7 Formal education: 7 Pre-hospital: ad hoc lectures
Years of experience in clinical teaching	6

3.9 Ethical Considerations

After undergoing peer review and presentation to the Department of Nursing Education, permission to conduct the study was obtained from the following authorities;

- The Committee for Research on Human Subjects (Medical), University of the Witwatersrand,
- The Postgraduate Committee, University of the Witwatersrand,
- Informed consent from participating registered/certified Trauma and Emergency trained nurses for both the focus group and the survey (questionnaires).

Permission from the SANC was obtained for access to the register and for the use of names and addresses of emergency nurses. Telephonic consent was first obtained from the emergency nurses who formed the expert focus group. This was followed by written consent, which was obtained on the day of the expert focus group interview. Written informed consent was obtained from all the respondents. All participants in the study were given information regarding the aim and nature of the research and the right to withdraw at any stage.

Confidentiality and anonymity of participants to the questionnaire was ensured as no names were attached to the information produced. . The consent forms were separated from the survey (questionnaires) and all data obtained was kept in a secure place and will be destroyed on completion of the research study. However, there are very few experts with the qualifications of the expert focus group so their anonymity could not be assured and this was explained to them. Code numbers were used, without names on all documents collected from the expert focus group and other study participants.

The use of action research was intended to benefit both the researcher and participants and this was stated upfront. As a result there was good collaboration between the researcher and focus group. The benefit to practitioners could enhance patient care, which is the goal of nursing research. This study can have an impact on other health care professionals involved with emergency services and they were not included in the study, which could negatively affect the implementation of change (Badger, 2000:205). However no participants were harmed in any way.

In action research the researcher is actively and subjectively involved in the research. However, scientific objectivity was enhanced through obtaining the data from the expert focus group and through validation by the rest of the emergency nurse population.

Co-operation and collaboration was maintained between the researcher and the expert focus group through identification of a common concern, good communication and truthfulness (Denzin & Lincoln, 1994:75).

3.10 SUMMARY

This chapter outlined the research methodology implemented, as well as the process of design and testing of the research instruments. A pilot study was conducted with an expert emergency nurse with the same characteristics as the emergency nurses who were involved in the expert focus group interview. The data identified allowed the researcher to refine the plans for the expert focus group interview. The data obtained and agreed upon by the emergency nurse group of experts were weighted by means of a VAS, developed into a questionnaire and sent out for validation to the rest of the emergency nurse population. The

data was then used together with the weighting to formulate a document for use during policy formation and as an instrument for educational purposes.

The following chapter will discuss the data analysis and the results.