

**AN INVESTIGATION INTO THE NON-COMPLIANCE OF ADVANCED LIFE
SUPPORT PRACTITIONERS WITH THE GUIDELINES AND PROTOCOLS
OF THE PROFESSIONAL BOARD FOR EMERGENCY CARE
PRACTITIONERS**

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ABSTRACT

Purpose

The Professional Board for Emergency Care Practitioners (PBECP), a division of the Health Professions Council of South Africa, regulates the scope of practice and publishes guidelines and protocols that advanced life support (ALS) practitioners are required to follow. These define an acceptable, standardised approach to each commonly encountered emergency. Non-compliance with the guidelines and protocols regularly occurs, which could impact on the quality of care delivered and may result in further injury or death of the patient. This study investigated the reasons for non-compliance by ALS practitioners and explored how compliance could be improved.

Methodology

The study was conducted in the interpretive paradigm using a grounded theory approach. The population was ALS practitioners in the Western Cape. Purposeful sampling was used to select the sample. Focus group discussions and interviews were used for data collection. The data was analysed using interpretative methods of analysis, in order to achieve the research objectives.

Findings

The health system focus on delivering health care to the community as part of the Primary Health Care focus has created new challenges for the ALS practitioner. The PBECP guidelines and protocols do not accommodate the unique circumstances of rural ALS practice and this disjuncture between the guidelines and protocols and the realities of rural health care contribute to the eventual non-compliance.

The EMS organisation's inability to provide clinical supervision consistent with the PBECP guidelines and protocols; ensure adequate support for practitioners in rural services and effectively monitor and evaluate ALS clinical practice has created a fertile environment for non-compliance.

The processes used by the PBECP to develop and implement guidelines and protocols are regarded as non-scientific, lack consultation and conflict with other universally accepted guidelines. The delayed implementation of continuous professional development as a requirement for continued registration and the absence of clinical updates prior to the release of revised guidelines and protocols, contribute to non-compliance.

Significant changes are underway to address the quality of education and training of emergency care practitioners. The introduction of the mid-level worker, the professional degree and continuing professional development bode well for the future of the profession and emergency medical services. A strategy to develop the existing practitioners, who will continue to be the backbone of emergency medical services for the foreseeable future, is needed.

The ALS practitioner is at a critical stage in the evolution to becoming a professional. The immaturity of the profession is evidenced by the absence of local research and publications, the lack of inward reflection, desire for self improvement and genuine concern for adopting best practice recommendations. The formation of an association to further the interests of professionalism is urgently required.

Conclusions

Non-compliance is as a result of several interrelated factors that influence the ultimate decision of the ALS practitioner not to comply with the PBECP guidelines and protocols. A multi-factorial approach, spearheaded by the all stakeholders is required to improve compliance.

DECLARATION

The author hereby declares that the content of this research project is the author's own unaided original work, except where specific indication is given to the contrary (by reference). This work has not been previously submitted to the Durban University of Technology or any other University.

Signature: _____

Date:

DEDICATION

I would like to dedicate this work to:

- My mum Caroline and late dad Desmond, for their inspiration, love and example.
- Lynnell and Daniel Christopher for their love, understanding and support.

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ACRONYMS AND ABBREVIATIONS

ACLS:	Advanced Cardiac Life Support
AIDS:	Acquired Immune Deficiency Syndrome
AHA:	American Heart Association
ALS:	Advanced Life Support
BMJ:	British Medical Journal
CME:	Continuing Medical Education
CPD:	Continuous Professional Development
CPR:	Cardiopulmonary Resuscitation
ECP:	Emergency Care Practitioner
EMS:	Emergency Medical Service
HIV:	Human Immunodeficiency Syndrome
HPCSA:	Health Professions Council of South Africa
ILCOR:	International Liaison Committee on Resuscitation
NCEMS:	National Committee on Emergency Medical Services
PALS:	Paediatric Advanced Life Support
PBEC:	Professional Board for Emergency Care Practitioners
SAMF:	South African Medicines Formulary
SARC:	South African Resuscitation Council

WHO: World Health Organization

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CHAPTER 01: INTRODUCTION

1.1. Background to this Research

There has been a rapid evolution of the paramedic profession since the establishment of the Professional Board for Emergency Care Practitioners (PBECP) under the jurisdiction of the Health Professions Council of South Africa (HPCSA) in 1992. The days when firemen, cross trained as ambulance drivers, delivered sick and dying patients to hospital in the back of unequipped vehicles are behind us. Ambulance drivers have gradually been replaced by a growing body of emergency care practitioners. On-the-job training has been substituted with nationally regulated training and education that allows registration with the HPCSA as a Basic, Intermediate or Advanced Life Support practitioner. The PBECP regulates the scope of practice of emergency care practitioners by means of guidelines and protocols, which it approves. The guidelines and protocols undergo periodic revision in keeping with international best practice. The current guidelines and protocols were issued in 2003. These guidelines and protocols describe the authority and responsibility of the ALS practitioner in performing emergency clinical procedures and administering approved medications in commonly encountered emergencies. Non-compliance

with the guidelines and protocols may cause further harm and suffering for patients.

The researcher qualified as an Advanced Life Support (ALS) practitioner in 1989, and is the present Chairperson of the PBECP and the Head of Department of the Department of Emergency Medical Care at the Cape Peninsula University of Technology. The non-compliance of ALS practitioners with the 2003 guidelines and protocols had been discussed at the PBECP which became aware of the problem by the evidence presented in complaints to the Board. Consequently the PBECP identified the need to explore the reasons for non-compliance and seek ways to improve compliance.

The extent of non-compliance with the PBECP guidelines and protocols was established in a pilot study undertaken by the researcher. The study used a questionnaire to gather data on non-compliance from National Diploma: Emergency Medical Care students, who were witnessing ALS practice whilst undertaking service learning with qualified ALS practitioners. The pilot study confirmed that non-compliance regularly occurred. The students estimated that they had witnessed ALS practitioners transgress the PBECP guidelines and protocols in 35% of calls during 2005. The most common transgression related to incorrect drug usage and dosage administration.

Based on the discussions at PBECP level and the findings of the pilot study, it became clear that non-compliance with the guidelines and protocols was a problem which needed to be investigated.

1.2. Purpose of Study

The purpose was to determine why advanced life support practitioners do not comply with the Professional Board for Emergency Care Practitioners 2003 guidelines and protocols and to explore how compliance could be improved.

1.3. Objectives of the Study

The first objective was to describe ALS practitioners' perceptions as to the reasons for non-compliance with the 2003 PBECP guidelines and protocols.

Based on the findings, the second objective was to determine how compliance with the 2003 PBECP guidelines and protocols by ALS practitioners could be improved.

1.4. Motivation for the Study

The study was motivated by a request from the PBECP that specifically sought to gain insight into the, hitherto undocumented, ALS practices of non-compliance with the guidelines and protocols, without accusing the practitioners of misconduct.

The second motivation was to identify strengths and weaknesses in the current guidelines and protocols and in so doing inform the future development of PBECP guidelines and protocols.

The third motivation was to find out how compliance could be improved and in so doing identify areas of risk, as this may decrease patient morbidity and mortality, limit inappropriate practice and ensure cost saving by better utilisation of resources.

1.5. Assumptions of the Study

The first assumption was that all practitioners are aware of the existence of PBECP protocols by virtue of their registration with the PBECP.

The second assumption was that all practitioners are duty bound and legally obligated to comply with the PBECP guidelines and protocols and that guidelines and protocols are needed for ALS practice.

The third assumption was that the PBECP has a responsibility to determine and approve ALS guidelines and protocols.

The fourth assumption was that guidelines and protocols are necessary to regulate scope of practice of the ALS practitioner.

1.6. Reflection on the Study

The investigation did not compare the differences in perceptions between compliant and non-compliant practitioners in respect of the research question. Whilst this could have been valuable from a research point of view, it would have created ethical problems. The reason for this is that it would have necessitated acknowledgement of non-compliance by the practitioners. As this is ethically and legally unacceptable, and especially as the researcher is the Chairperson of the PBECP, practitioners may not have participated voluntarily in the study. It is therefore unlikely that it would have obtained approval by the Faculty Research Committee.

The ALS practitioners, who participated in the study, reside and practice in the Western Cape Province. Their experiences of health care are within this particular socio-economic context. The Western Cape Province is unique in that it has the lowest South African unemployment rate (18.4%); poverty rate (19.9%) and infant mortality rate (8.4%) when compared to the other eight provinces in South Africa. In comparison the Limpopo Province has the highest unemployment rate (36.1 %) and the Eastern Cape has the highest poverty rate (64%), and the highest infant mortality (61.2%) (Pelser, 2004:206-210). It is therefore possible that participants that practice in a different socio-economic context may have provided different reasons for non-compliance and approaches to improving compliance than those obtained in this study. However, the researcher, as Chairperson of the PBECP interacts frequently with practitioners from other provinces and based on this experience believes that the findings would not be significantly different. Furthermore, the ALS practitioners that participated in the peer review of the recommendations of the

study reside and practice in two other provinces. They agreed that the recommendations were applicable nationally.

1.6.1. Researcher's Perspectives

In order to make explicit my perspectives at the beginning of the study, I present the following:

As the researcher, I am myself an ALS practitioner. I also serve as the Chairperson of the PBECP and I am the Head of Department an Emergency Care Department at an academic institution.

The emergency care profession is fragmented and divided as a result of historical differences between private and public health delivery systems, CCA and National Diploma qualified practitioners and practitioners from different provinces. These divides present an obstacle to the professional development of the practitioner.

The independence of ALS practice is undermined by the historical vestiges of the paramilitary style EMS systems that employed, trained and clinically controlled ALS practitioners with little opportunity for independent practice.

The short course training has been perpetuated by the private sector EMS training organisations, the motivation for which is largely financial. The tertiary institutions, Emergency Care Departments have had capacity limitations and have not been able to sufficiently address the EMS under-graduate requirements. In turn, even the public sector institutions who are not financially motivated have contributed to the perpetuation of short course training and the resultant delay in the attainment of professionalism in EMS.

The PBECP as an organ of the HPCSA has demonstrated questionable levels of efficiency and effectiveness in executing its mandate to protect the public and guide the profession.

1.7. Definition of Terms

1.7.1. Advanced Life Support (ALS) Practitioner:

A health care professional that has completed the Critical Care Assistant course or the National Diploma in Emergency Medical Care and whose name appears on the ALS Emergency Care Practitioner register of the Health Professions Council of South Africa .

1.7.2. Emergency Care:

The rescue, evaluation, treatment and care of an ill or injured person in an emergency care situation and the continuation of treatment and care during the transportation of such person to or between health establishment(s).

1.7.3. Guideline:

Systematically developed statements to assist practitioners make patient decisions about appropriate health care for specific clinical circumstances.

1.7.4. Paramedic:

This term is synonymous with the term ALS Practitioner. Within the profession, an ALS practitioner may also be referred to as "ALS", "CCA" or "NDip".

1.7.5. Protocol:

A protocol is a precise, detailed plan for administering a regimen or therapy.

1.7.6. Independent practice:

A practitioner registered with the HPCSA who is an independent practitioner and is therefore permitted by law to provide care and services, without direction or supervision, within the scope of the practice as approved by the HPCSA.

1.7.7. Supervising medical practitioner:

A medical practitioner, usually employed by emergency medical services, who may provide direct or telephonic clinical support and advice to ALS practitioners.

1.7.8. Scope of practice:

A list of capabilities and approved medications that are authorised for use by practitioners whose names appear in the corresponding register of the HPCSA.

1.7.9. Non-compliance:

A failure to adhere to a prescribed guideline and protocol.

1.7.10. Rural/Urban Areas

Within the context of this study, the West Coast, Cape Winelands, Overberg, Eden and Central Karoo are rural areas. Although rural areas may include densely populated towns such as George, there are fewer hospitals and the average ambulance mission time (time call received until ambulance is available for next call) is estimated at 110 minutes with an average travel distance of 49km (Provincial Government Western Cape, 2006). The metropolitan city of Cape Town and the adjacent towns, bordered by Strand, Stellenbosch, Paarl and Melkbosstrand are defined as an urban area. The mission time in the urban area is 60 minutes.

1.8. Overview of the Dissertation

Chapter 1 introduces the study and includes a background to the study, purpose, objectives, motivation, assumptions and definitions. The literature review that contextualises the study is found in Chapter 2. Chapter 3 addresses the study methodology with regards to design, population choice, sampling, data collection, data analysis and ethical issues. Chapter 4 describes the findings in respect to the reasons for non-compliance with the PBECP guidelines and protocols. Chapter 5 presents the findings in respect of the second objective, which deals with how compliance can be improved. Finally the conclusion, critical review and recommendations can be found in Chapter 6. References and appendices follow.

Chapter 2

2.0. Literature Review

Any investigation into the reasons for non-compliance with clinical guidelines and protocols must examine the environment in which Advanced Life Support practice occurs. The following literature review will provide the background that will contextualize the current health system in South Africa, and against this backdrop examine the role and function of Emergency Medical Services (EMS) and the Professional Board for Emergency Care Practitioners (PBECP) in relation to Advanced Life Support (ALS) practice. The literature review will then focus on the development and use of guidelines and protocols. Finally, documented reasons for non-compliance with guidelines and protocols and studies on non-compliance with guidelines and protocols are presented.

2.1. Background Literature

2.1.1. The Health System in South Africa

The World Health Organisation defines a health system, as all the people whose actions have as their primary purpose to promote, restore or maintain health (World Health Organisation, 2000:5). It encompasses the total network or system of services and the provision of care in a country, including all particular health care or health services such as Emergency Medical Services (van Rensburg, 2004).

The health system in South Africa is embodied in the South African Constitution (Act 108 of 1996). Section 27 of the Constitution states that the people of South Africa must have access to health care services and that no one may be refused emergency medical treatment. Prior to the promulgation of the Constitution, health care services were deemed a privilege rather than a right.

Government policy documents such as the Constitution, the National Health Plan (1994), the Reconstruction and Development Programme, Policy Framework document (1994), the National Health Bill (2002) and the White Paper on Transformation of the Public Service (1997) all give direction to the transformation of health services in South Africa (van Rensburg and Pelsler,

2004:110-115). The Health Act (Act No. 61, 2003) aims to establish a health system based on decentralised management, principles of equity, efficiency, sound governance, internationally recognised standards of research and a spirit of enquiry and advocacy which encourages participation (South Africa. Health Act 2003:3).

Prior to the first democratic elections in 1994, the resources within the health system, such as the location and distribution of hospitals, catered mainly to the needs of the minority white population (Nicholson, 2001:24-27). Nicholson further explained that the apartheid health system was unequal, fragmented and wasteful and had as its focus the curing of disease rather than the prevention of disease. To correct the previous fragmented and inefficient health system, the Department of Health adopted the District Health System as a model for delivery of equitable, efficient and effective health services based on the principles of Primary Health Care. The District Health System supports the principles of community involvement, integrated holistic health care delivery, inter-sector collaboration and a grass roots approach to planning, policy development and management.

To create an equitable health system with a Primary Health Care focus, Central hospitals are being downsized and resources are being relocated to support Primary Health Care facilities that have been established in disadvantaged areas (Perrott, 2003:325). Despite this the burden of third-world diseases such as HIV/AIDS, tuberculosis, and periodic endemics of measles and other childhood illnesses are still prevalent, according to Perrott. He also notes that the lack of immunization, poor sanitation, malnutrition, poor education, and the social climate of unemployment and poverty have resulted in high infant mortality.

There are three levels of hospitals in South Africa. A District hospital that is Level 1 employs General Practitioners, Medical Officers and Primary Health Care nurses. The Regional hospitals receive referrals from Level 1 hospitals and provide specialist services that include general surgery, orthopaedics, general medicine, paediatrics, gynaecology, radiology and anaesthetics. A

Level 3 or Central hospital functions as highly specialised referral unit and employs highly trained specialists (Department of Public Service and Administration, 2006).

Trauma injuries resulting from interpersonal violence accounted for between 1.25 million and 1.5 million cases that were reported to state hospitals in 1999. As a result Primary Health Care facilities are required to provide trauma and emergency health services and are required to have an appropriate number of emergency health staff to give trauma victims appropriate emergency care (Redelinghuys and van Rensburg, 2004:264). Accordingly, the facilities are expected to have emergency 'boxes', equipment, drugs and supplies.

Van Rensburg and Pelser (2004:162-165) note that the factors influencing the health system are complex. Environmental determinants such as demographics, geography, political, economic, religious factors all play a role. The South African health care landscape has a unique blend of western, traditional and alternative medicine with western health care provided in hospitals, clinics and by private medical practitioners. Traditional medicine is provided by traditional healers called Isangomas, or diviners and Inyangas, or herbalists. Complementary and alternative medicine, such as homeopathy, is provided by a wide range of allied health practitioners.

The White Paper for the Transformation of the Health System in South Africa (1997) presented a set of policy principles and objectives that defined the structure of an integrated health system, according to Clarke (1998:367). It established the functions at a national, provincial and district level. The provision of Emergency Medical Services is a provincial competency in terms of the South African Constitution and the provision of emergency care has been identified as a health priority. Although EMS is not considered Primary Health Care, it is seen as integral to a comprehensive health care system. This is principally because adequate emergency facilities and pre-hospital care have not been available in many disadvantaged areas.

2.1.2. Emergency Medical Services

Emergency Medical Services (EMS) has developed rapidly since 1977 when a decision was taken that made the provision of ambulance services a provincial government competency (MacFarlane, van Loggerenberg and Kloeck, 2004:145). Pre-hospital care has since transformed from a transport service that provided a basic level of care for the sick, operated by isolated municipalities to a fully fledged emergency service. Today EMS is a complex, sophisticated system that provides advanced life support care to mainly urban and certain rural parts of the country. The pockets of sophistication that exist are equal to those of any first-world EMS. Further strides in the evolution of EMS were made when, in 1992, regulations were passed that made it compulsory for all emergency care practitioners to register with the then South African Medical and Dental Council.

The nine provinces in South Africa are not equal in terms of how their communities are served and resources are distributed (Clarke, 1998:368). Individual provinces fund their EMS from nationally allocated funds. EMS's in the Gauteng, Western Cape and KwaZulu-Natal provinces are generally better funded and well resourced. Private EMS's are distributed throughout South Africa and are primarily located in the more economically viable metropolitan regions. Ambulance services in the former apartheid created homelands used ambulances with unqualified staff and little equipment to transport patients between hospitals. The amalgamation of these homeland ambulance/transport services into the provincial EMS's created imbalances that still exist today.

The Department of Health in the Eastern Cape, as an example according to Clarke (1998:368), has begun to redress the imbalances in recent years. Until 1996, services in this and other provinces, were duplicated and fragmented because municipal governments did not want to cede the autonomy and control that they had over the services since before 1994. The Eastern Cape Department of Health combined all municipal and homeland services and created the Eastern Cape Emergency Medical and Rescue Service. The vision of the Eastern Cape EMS encompasses seven goals: improved communication systems; coordination of services; development of human resources; equitable distribution of resources; community involvement; community education in first

aid, accident prevention, proper accessing of the ambulance service; and respect for all citizens.

MacFarlane, van Loggerenberg and Kloeck, (2004:147) explain that the EMS system serves two functions; emergency response and inter-hospital patient transfers. All provinces experience problems associated with the use of emergency services to transport out-patients between hospitals or from clinics to hospitals. This demand is as a result of the reorganization of the Primary Health Care system. As the mandates of state hospitals change to a Primary Health Care focus, some hospitals are expanding while others have diminished their level of service based on rationalization of resources and community needs. These changes have been too rapid for many communities to adapt. The transition has placed a burden on EMS as there is an increase in the number of patients being transferred from one health facility to another. To remedy this situation, public education, improved public transport or a basic medical transport service is required.

Emergency Medical Services is usually the patient's first point of contact with the health system (Provincial Government Western Cape, 2006:156). Emergency care can include a variety of services that vary in complexity such as: telephonic advice; basic, intermediate and advanced life support; rescue services; and aero-medical services. Agreement must be reached regarding the appropriate standards of care for each service. The lack of close coordination of EMS services impacts on the efficiency of the entire service.

Nationally, EMS can be activated by calling a toll-free emergency number, 10177 or from the 112 number from a cellular telephone (Clarke, 1998:368). The Department of Communications is currently implementing the 112 toll-free emergency telephone number for all emergencies. Emergency calls to the emergency communications centre are triaged according to severity of the emergency. The dispatcher uses this information to determine the priority of the emergency and then allocates EMS resources depending on their availability and seriousness of the incident. Advanced Life Support (ALS) practitioners are a scarce resource and are usually only assigned to respond to emergency calls that are deemed to be immediately life threatening.

Clarke (1998: 372) noted that because of the distances to clinics in rural areas, adequate communications are needed between ambulances, clinics, secondary and tertiary hospitals to ensure the efficient transport of the critically ill or injured. The shortage of medical practitioners in the Trauma and Emergency units of rural hospitals is a concern. Due to limited resources in rural areas, ALS practitioner skills may need to be altered, to include immunizations and the provision of community education on emergency care prevention. This will meet the needs of the communities and is in keeping with the Primary Health Care approach.

2.1.3. Professional Board for Emergency Care Practitioners

The Health Professions Council of South Africa (HPCSA) is a statutory body, established in terms of the Health Professions Act (Act No. 56 of 1974) as amended (Amendment Act 1 of 1998). Its mandate is to protect the public, all consumers of health care services, and to provide guidance on educational, professional and ethical issues to health practitioners (Health Professions Council of South Africa, 2004). The HPCSA provides guidance to twelve professional boards in setting health care standards for training and discipline in the professions registered with the Council; ensuring ongoing professional competence; and fostering compliance with those standards. The HPCSA is an autonomous organization that is funded entirely by the health care professions it represents.

The Professional Board for Emergency Care Practitioners was established in terms of regulations published under Government Notice (Notice No. R 173 of 10 January 1992) (Health Professions Council of South Africa, 2004). As with the other Professional Boards, the PBECP operates as a Standards Generating Body (SGB), developing policy documents to guide the emergency care profession, as well as overseeing education and training outcomes. The Professional Boards are responsible for formulating the rules and regulations of conduct and professional practice, as well as conducting preliminary and professional enquiries. Regulations that govern the scope of practice of practitioners and on which guidelines and protocols are based are published by

the HPCSA. These regulations legally bind the practitioner to comply with the guidelines and protocols of the Professional Boards.

2.1.4. EMS Education and Training

The regulation of emergency care training falls under the jurisdiction of the HPCSA and the PBECP (Health Professions Council of South Africa, 2004). In this regard the Professional Boards generate education and training outcomes and accredit education and training providers

Emergency medical care training in South Africa follows two streams, these being the short course training undertaken at any one of 57 Colleges nationally or the 3-year National Diploma in Emergency Care offered at four Universities of Technology situated in Durban, Cape Town, Johannesburg and Bloemfontein (Health Professions Council of South Africa, 2006).

The vast majority of practitioners follow the short course route of training that starts with a one month Basic Ambulance Assistant (BAA) course (Clarke, 1998:369). After having completed several months of on the road experience as a BAA, a further four month training programme will qualify the practitioner as an Ambulance Emergency Assistant (AEA). Following at least six months experience as an AEA the practitioner may enter the nine month Critical Care Assistant (CCA) course that qualifies him/her as an Advanced Life Support practitioner. The CCA practitioner and the National Diploma qualified practitioner share the same scope of practice which is embodied in the protocols published by the PBECP.

A review of the South African nursing colleges found that they have under-qualified staff, lack management capacity and have developed a particular culture and ethos (Mekwa, 2000:278). She explains that the colleges are run like schools with crammed timetables and a strong emphasis on "practice". College personnel are not expected to produce research or generate new knowledge. For similar reasons the PBECP's October 2006 newsletter mentions the need to improve the Colleges of Emergency Care (E.C. News, 2006:3).

In contrast to nursing and ambulance colleges, nursing and emergency education at the Universities of Technology is comparatively more theory-orientated and uses predominately a learner centred problem-based learning approach (Mekwa, 2000:278). Problem-based learning is an appropriate pedagogical technique for health learners. It allows the learner to explore options and gain the capacity for developing strategies based on reflective decision making. The development of critical thinking and reflective skills, in learners and practitioners, can influence change and equip practitioners to cope with diversity in a more creative way. Clinical tutors serve as important role models and should encourage students doing experiential learning to analyse and respond flexibly to individual patient's problems.

For the reasons given by Mekwa (2000:278) and in the E.C. News (2006:3), the PBECP is concerned that the present format of short course training is inadequate to meet the future health needs of the country and has proposed terminating short course training in favour of formal education.

The move towards formal higher education training and the use of clinical protocols is not unique to EMS in South Africa. Black and Davies (2005:24) in their description of EMS systems in the United Kingdom (UK) speak of a growing trend of Universities developing a 3-year modular course. In the UK, clinical care is delivered by paramedics adhering to national clinical protocols. Ambulance practitioners are expected to undertake refresher training every 3 years (Black and Davies, 2005:24).

Education should take place every time a standard, such as the protocol, is changed in order to reinforce high quality patient care, update the practitioner regarding newer treatment modalities and equipment, and remedy perceived deficiencies (Schneider, et al. 1994:134). At present, recertification of Emergency Care Practitioners is not required in South Africa, although the PBECP does encourage practitioners to engage in Continuing Professional Development (CPD) activities (Health Professions Council of South Africa, 2004). Such activities have been shown to be beneficial, especially in terms of

learning the latest practice guidelines and protocols, and ensuring skills retention (Schneider, et al. 1994:134). CPD is recognised as necessary to improve clinical practice through activities like reflection, evaluation and consideration of the evidence base (O' Sullivan, 2004:174). It is envisaged that CPD for emergency care practitioners will become compulsory in 2007 (E.C. News, 2006).

The Advanced Cardiac Life Support (ACLS), Paediatric Advanced Life Support (PALS) and the Advanced Trauma Life Support (ATLS) courses are available to ALS practitioners and have been shown to be beneficial especially in terms of the encouraging the use of the latest practice guidelines according to Schneider, et al. (1994:129). They also note that retention of skills is ensured by continuous practical training.

2.1.5. Quality of Care in EMS

The Institute of Medicine, in a report titled "To Err is Human: Building a Safer Health System", used data from several large studies, to conclude that between 44 000 and 98 000 deaths a year are the result of medical injury in the United States. This would rank medical error as the eighth leading cause of death in the United States (Burstin, 2002:1074). Through rational conjecture, by complying with an accepted standard of care, not only is quality assured but lives are saved and human suffering alleviated.

The inference that compliance with internationally accepted standards of care is linked to quality of care is not disputed. The core business of EMS is to improve the quality of emergency medical care provided to the people in the provinces, decrease morbidity and mortality and revitalise EMS. Organisational issues to support the above, include improving resource mobilisation and management of resources, without neglecting the attainment of equity in resource allocation (Harambe Institute, 2002). Also, human resource management and development must be improved, as must communication and consultation within EMS, and between the service and the communities served.

The quality of EMS care was described in the KwaZulu-Natal: Emergency Medical and Rescue Service (KZN-EMRS) quality improvement policy development report, compiled by Naidoo (2002). It investigated healthcare users' perceptions of levels of performance in KZN-EMRS and perceptions of quality amongst the KZN-EMRS staff. The questionnaire probed 16 different areas, of which, in the area of technical competence, 37 % of the respondents indicated that the levels of technical competence were unacceptable. Naidoo's (2002) questioning of the competence levels of the emergency care practitioners is in relation to their psychomotor clinical skill which is not within the scope of this study (Naidoo, 2002).

There are several measurable dimensions of quality according to Cook and Sinclair (1997:890). Safety - how safe is one's practice from causing potential harm to one's patient? Provider competence - does one have the necessary knowledge, skills and attitude to provide competent care? Acceptability - does one's care meet the expectations of the patient and other health workers? Accessibility - how easy is it to obtain one's service? Efficiency - does one's service perform with minimum wastage? Appropriateness - is one doing the right things and providing the correct and proper care? Effectiveness - is one doing the right things right and does the care that one provides meet with expected results. Non-compliance with guidelines and protocols may compromise patient safety, raise concerns about practitioner competence, be unacceptable to patients and other health workers, be inappropriate, and reduce the efficiency and effectiveness of the care provided.

The frequency and nature of complaints from patients, public and other health professionals may be used to measure the quality of service provided and identify areas of weakness in the organization. There are numerous areas within EMS that carry the potential to generate complaints. The three most common originators of complaints were: patients (53%), medical personnel (19%) and family member or friends (12%). Interestingly, Colwell, Pons and Pi (2003:405), in a retrospective study conducted in Denver, USA found that there were no instances of paramedic partners filing complaints against each other. Rude behaviour or the use of excessive force accounted for 27% of the

complaints, reinforcing the notion that not everyone knows what constitutes good or bad medicine, but nearly everyone is aware of the difference between good and bad behaviour. Complaints by other medical personnel related to poor medical judgement or technical skills, emphasises quality of patient care. Internal complaints generated from sources such as the EMS crews and receiving and referring hospital staff receive less attention than do complaints from the public. This study is limited by its retrospective design that depended on finding complaints in the paramedic division achieves. Importantly the authors found from previous studies that the majority of dissatisfied clients do not register complaints and therefore their reasons for dissatisfaction are not reflected in the results.

MacFarlane and Benn (2003:189) found that pre-hospital care is a difficult area to monitor and evaluate because of the multitude of variables. Accurate data is emphasised as being necessary to describe customer needs, evaluate performance, establish goals for improvement, and monitor progress. Sources of data can include; patient return form data, stakeholder data (e.g., from medical aid companies, road accident fund, etc.), satisfaction data are used to determine how well the EMS system is meeting the needs of patients and other stakeholders, process data are important for identifying and managing local needs, such as, vehicle use, age, kilometres, maintenance status and reliability; provider training, education data; financial data; and other administrative data. Process data can be used to determine the root cause of problems and to compare performance against quality indicators.

Monitoring and evaluation of performance indicators and reviewing data such as the patient report form data are important to track the progress that EMS is making towards delivering a quality service. Importantly the patient report form data may reflect the non-compliance of ALS practitioners with the PBECP guidelines and protocols.

2.2. Literature on Compliance with Guidelines and Protocols

An internet search using Google Scholar and Medline did not reveal any South African studies on compliance with guidelines and protocols. Prospective randomised studies on the topic were found to be uncommon in a review of the international literature.

One method of improving the quality of care is the use of guidelines and protocols. An American study concluded that their use by medical practitioners could reduce the high degree of morbidity and mortality associated with preventable iatrogenic injury (Burstin, 2002:1074).

Confusion can arise as to how a guideline is defined and is to be used as is illustrated by Scott (1996 as cited by Schwartz, et al. 1999) in the following extract:

“Lady Thatcher: ‘They are exactly what they say, guidelines, they are not the law’. ‘They are guidelines’. Ms Baxendale: ‘Do they have to be followed?’ Lady Thatcher: ‘Of course, they have to be followed, but they are not strict law’. ‘That is why they are guidelines and not law; of course, they have to be applied according to circumstances.’”

Schwartz et al. (1999:1153) concludes that the U.S. Institute of Medicine definition of a guideline is the simplest to understand and use. The definition states that guidelines are: “Systematically developed statements to assist practitioners to make patient decisions about appropriate health care for specific clinical circumstances”.

A protocol is defined as a precise, detailed plan for administering a regimen or therapy (American Society for Testing and Materials in Clawson, Martin and Hauert, 1994).

A protocol stipulates a precise dose and therefore does not allow the practitioner any deviation whereas a guideline allows for the practitioner to use clinical judgment and administer a drug until the desired effect is achieved or the maximum dose is reached.

A review of cases brought before English courts concludes that the mere fact that a protocol or guideline exists for the care of a condition, does not of itself establish that compliance with it would be reasonable in the circumstances, or that non compliance would be negligent (Schwartz, et al. 1999:1154-1155). As guideline use becomes increasingly popular, so acting outside guidelines could expose practitioners to the possibility of being found negligent, unless they can prove a special justification in the circumstances.

Morris (2003:236) concludes that excess information in complex intensive care environments exceeds human decision-making limits so increasing the variation in clinical care and clinical errors. This study places importance on distinguishing guidelines and inadequately explicit protocols from adequately explicit protocols concluding that only adequately explicit protocols will lead different practitioners to the same decision when faced with the same clinical scenario.

Moody-Williams, et al. (2002:409) do not differentiate between a guideline and a protocol. When writing on their use, noting that they:

- are used to assist practitioners to make decisions regarding appropriate health care for specific clinical circumstances;
- are especially useful in emergencies where the luxury of time to consult on best practice is rare;
- should be evidence-based;
- counter the tendency for medical practice to be anecdotal and parochial;
- can decrease unnecessary variations in care and improve quality;
- must be flexible and be used as a tool together with sound clinical judgment;
- should avoid undue complexity;
- should be well researched;
- should be widely distributed after development; and
- should be continually updated.

In the South African EMS context these criteria for protocols and guidelines are relevant and applicable.

2.2.1. Guideline and Protocol use in EMS

MacFarlane, van Loggerenberg and Kloeck (2005:148), note that basic, intermediate and advanced emergency care practitioners in South Africa are required to register with the Professional Board for Emergency Care Practitioners (PBECP), in order to practice their profession. In addition, their scope of practice is governed by guidelines and protocols that are determined by the PBECP. The scope of practice of ALS practitioners allows them to practice advanced clinical skills and administer up to Schedule seven medications within the PBECP stipulated protocols and guidelines (MacFarlane, van Loggerenberg and Kloeck, 2005:148). Section 22A (9) of the Medicines and Related Substances Control Act (Act 101 of 1965, amended Act 90 of 1997) stipulates that Schedule seven and eight drugs are prohibited substances. No person may acquire, use, possess, manufacture or supply Schedule seven substances unless he or she has been issued with a permit by the Director-General of Health (South Africa. Medicines and Related Substances Control Act 1965:10).

In 2003 the PBECP published and circulated a revised basic, intermediate and advanced life support scope of practice that prescribed the approved medications, protocols, capabilities, regulations and ethical rules (Health Professions Council of South Africa, 2003). They describe the authority and responsibility of the emergency care practitioner and they provide an acceptable, standardised approach to each commonly encountered emergency. Deviation from the PBECP guidelines and protocols may result in further injury and suffering to the patient and could result in a disciplinary inquiry (See Appendix 4:3 for extracts from the PBECP guidelines and protocols). A notice in the ALS practitioner 2003 guidelines and protocols, states that the practitioner must familiarise himself/herself with the contents of the document and that the inherent recommendations and guidelines replace all previous versions and publications issued under the authority of the Professional Board (Health Professions Council of South Africa, 2003).

The PBECP 2003 guidelines and protocols are based on the 2000 International Liaison Committee on Resuscitation (ILCOR) Guidelines 2000 for

Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. These guidelines were finalised after a decade of international, scientific collaboration between seven international resuscitation organizations including the Resuscitation Council Southern African (Cummins, 2003:2). The PEBCP guidelines and protocols were developed in consultation with stakeholders that included educational institutions, emergency societies and associations, and subject experts. Drafts were circulated for comment prior to their approval and publication (Justus, 2006). Schwartz et al. (1999:1156) noted that the development of guidelines requires the correct interpretation of current scientific knowledge, contribution from all important groups, the use of precise definitions and a transparent process.

The use of guidelines and protocols in emergency care are not unique to South Africa. In the United Kingdom, clinical care is delivered by paramedics adhering to national clinical protocols (Black and Davies, 2005:25).

2.2.2. Studies on Non-compliance with Guidelines and Protocols

In spite of the apparent value of guidelines and protocols, health care practitioners do not always use them. There have been several international studies on the non-compliance of guidelines and protocols. A survey conducted by the American Academy of Paediatrics demonstrated that guidelines were only used by 35% of 600 Paediatrician respondents (Moody-Williams, et al. 2002:405).

The literature points to numerous examples of how quality of care may be compromised by poor clinical practices and not following internationally accepted guidelines. Katz and Falk (2001 cited in Sanders 2002:1065) found that 25% of patients studied had endotracheal tubes improperly placed by Advanced Life Support practitioners. The use of secondary confirmation devices have been shown to reduce the incidence of improperly placed endotracheal tubes. Clinical guidelines could be used to good purpose to introduce the use of secondary confirmation devices in emergency medical services.

Aaron, Smith and Litchy (2004:404) note that placement verification of any intubation is of vital importance as an unrecognised non-tracheal intubation can be rapidly fatal. Their study into intubation confirmation techniques associated with unrecognised non-tracheal intubations by pre-hospital providers found that in 35 of the 1643 cases evaluated, patients had misplaced endotracheal tubes and that the use of secondary confirmation devices was not universal. This study was a retrospective review of provider self reports. This proved to be a limitation of the study as details of the course of intubation could have been under-reported and not all cases were captured on the quality assurance database. Despite the low incidence, this result is significant because a misplaced endotracheal tube will almost certainly result in death.

A study on how effectively hospital personnel perform cardiopulmonary resuscitation (CPR) found that their practice did not conform to the CPR guidelines (Abella, Alvarado and Myklebust, 2005:305). Although the sample was small and specific to in-hospital resuscitation, the study emphasises the need for effective CPR that has been shown to improve chances of survival to hospital discharge. CPR effectiveness can be significantly compromised by using poor technique. This aspect of resuscitation has come under close scientific scrutiny in the last decade. Early and effective CPR has proven to be a significant indicator of the success of the resuscitation attempt and international guidelines have been published on the best CPR technique.

Hodgetts, et al. (1995:51) conducted a retrospective audit by analyzing the ambulance service report form and found that pre-hospital endotracheal drug dose was inadequate in 37.9% of cases and differed from the recommendations in a total of 43.2% of cases. Furthermore, Atropine was given in less than the recommended dose in 53.7% of cases and Adrenaline was given in twice the recommended dose in 20.5% of cases. No explanations are presented in this study as to the reasons for non-compliance with the recommended dosages.

A review of 5944 patient report forms collected over a three-year period from the King/Drew Medical Centre revealed deviations from pre-hospital

management protocols established by the Los Angeles Paramedic Training Institute, and from standard medical practice. The overall compliance to the protocols of 94% was found. Compliance to standard medical care was 97%. The most common deviations were failure to administer prophylactic Lignocaine to cardiac patients with chest pain and failure to apply cervical spine stabilisation in patients with suspected head trauma (Wasserberger, et al. 1986: 868).

Advanced life support calls during a two-month period were examined for protocol deviations by the University of Rochester, School of Medicine, New York (Stephan, Wrenn, and Slovis, 1991:1319). Of 1,246 calls examined, 16% had deviations. Approximately 55% of these deviations were minor, 38% were serious, and 7% were very serious in nature. The effects of the errors were evaluated using hospital records. Results showed that 89.5% of patients were unaffected, 5.0% improved, and 5.5% suffered complications from deviations. The report concluded that protocol deviations committed in pre-hospital environment does not usually cause direct harm to patients. A review of these deviations, revealed misconceptions in the use of intravenous therapy, a number of serious deviations in advanced cardiac life support protocols. The report further recommended studies of quality assurance to help identify areas of strength and weakness in an EMS system.

According to Cline et al. (1995:5-57) despite biannual Advanced Cardiac Life Support training of doctors and nurses in a rural hospital in North Carolina, non-compliance with Advanced Cardiac Life Support guidelines was noted in 35.2% of treatments. This study reviewed two hundred and seven cardiac arrests and found that synchronised cardioversion, calcium chloride and sodium bicarbonate were used with significantly higher non-compliance. The authors admit that the retrospective method used in this study may have increased the overall non-compliance reported due to inaccurate documents. Although this study was based on the 1992 resuscitation guidelines and protocols, it is likely that these findings could be extrapolated to non-compliance with current guidelines and protocols as it was found many deviations were as a result of last-ditch efforts in somewhat futile cardiac arrest situations.

The incidence of non-compliance with a blood transfusion algorithm was found to be 23% in a study conducted by Boralessa et al. (2002:213). In this prospective observational study, the authors observed patients undergoing knee surgery and requiring blood transfusion. The authors concluded that a transfusion algorithm together with staff education is effective in reducing both the number of patients transfused and inappropriate transfusions. A 77% compliance with guidelines and protocols that have little impact on mortality and morbidity may be regarded as a success. In the context of emergency resuscitations such statistics may be viewed negatively.

The most recent guideline regarding the management of patients surviving an acute myocardial infarction advocate the use of aspirin, beta blockers and angiotensin-converting enzyme and discourage the use of calcium-channel blockers. Axtell, Ludwig and Lope-Candales (2001:114) recorded that previously collected data from the National Registry in New York showed dismal compliance with these guidelines. To improve compliance a cardiac and pharmacy steering committee was formed. The pharmacist made recommendations to the physician if the physician had not prescribed adjunctive medication with no apparent contraindications. This interdisciplinary approach improved compliance with the percentage of patients receiving the adjunctive medications increasing significantly. The interdisciplinary approach may not be an option for the pre-hospital environment. However the doctor receiving from the ALS practitioner in hospital may encourage compliance by evaluating the pre-hospital patient management.

2.2.3. Reasons for Non-compliance with Guidelines and Protocols

Non-compliance can be as a result of non-competence for one can argue that a competent independent practitioner would not only be one that is legally qualified to perform acts within a specific ranges of skill, knowledge and ability but, would assume responsibility for ones own skills, knowledge and ability. Competence and compliance are related. A definition of competence refers to a condition of being legally qualified to operate to an adequate, safe standard (Clements and Mackenzie, 2005:516). The definition of compliance as it applies

in medicine is a willingness to follow a prescribed course of treatment (The American Heritage, 2000). Non-compliance with the guidelines and protocols may be in part due to poor competence.

A systematic review of the literature to identify barriers to physician guideline compliance was undertaken by Cabana et al. (1999:1458). This review found that barriers in one setting may not be present in another. Included in this review were seventy six articles that had investigated 293 potential barriers to guideline compliance. The barriers affecting compliance were classified into seven general categories: the barriers that affected physician knowledge (lack of awareness or lack of familiarity), attitudes (lack of agreement, lack of self-efficacy, lack of outcome expectancy, or the inertia of previous practice), or behaviour (external factors such as patient factors, guideline factors and environmental factors).

Reluctance to use guidelines and protocols may occur because the practitioner perceives that they were developed in a vacuum, are overly complex, are outdated, are too prescriptive or are not scientifically based (Moody-Williams, et al. 2002:405). A lack of research on pre-hospital emergency care has required EMS systems in the United States of America to write many clinical protocols based on little more than what is described as “guesses, anecdotes, gut feelings, and vendor-pushed gee-whiz technology” (Garza, 2006:24). Graff, et al. (2002:1093) also found that the higher the level of evidence the more likely it is that there will be compliance with the guideline. It is important therefore that guidelines should enhance the appropriateness and effectiveness of health care by narrowing the gap between what is known from research and what is actually practiced in health care setting (Moody-Williams, et al. 2002:405). The ILCOR guidelines addressed these concerns in the manner in which they were developed and are therefore internationally accepted as they have been shown to enable practitioners to provide care with consistent quality (Cummins, 2003:2).

One of the conclusions reached in a study conducted by Marco and Schears (2003:87) on pre-hospital resuscitation practices was that practitioners with

more than ten years experience were more likely to withhold resuscitation attempts in the presence of verbal "do not resuscitate" orders and were more likely to not start resuscitation if they considered the patient's condition futile. This finding may indicate that the years of experience of the practitioner may influence compliance with guidelines and protocols.

The effectiveness of monthly educational meetings to improve compliance with EMS patient transfer protocols in Turkey were evaluated by Armagan et al. (2004:857). The results of this observational study showed more appropriate care in some respects, such as the presence of cervical collar and proper airway management. However other parameters were not significantly different after the monthly educational meetings. The authors concluded that greater effort was required to increase compliance with other aspects of the transfer guidelines. This study highlights the importance of regular, focused continuing professional development of practitioners.

2.3. Summary

Notwithstanding the importance of investigating compliance with guidelines and protocols in emergency medical services in South Africa, a thorough search of the literature failed to reveal any such published studies. Emergency medical services are for many the first point of contact with the health system. Emergency care practice lends itself to the use of protocols and guidelines developed for use in this unpredictable, often complex environment. The reasons for non-compliance with the protocols and guidelines have not been adequately identified and addressed in the current world literature. By exploring and trying to better understand the reasons for non-compliance with the PBECP guidelines and protocols, this study could assist the profession in improving compliance. It could inform future protocol and guideline development and implementation with the ultimate aim of improving the quality of emergency care rendered to the South African public.

CHAPTER 3

3.0 METHODOLOGY

3.1. Introduction

In this chapter the methodology employed in this study with regards to study design, sampling, data collection, data analysis and interpretation, data trustworthiness and ethical issues will be presented.

3.2. Study Design

The study was conducted in the interpretive paradigm and used Strauss and Corbin's grounded theory method. Strauss and Corbin (1990 as cited in Brink, 1999:121) describe grounded theory as a research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon. In line with Strauss and Corbin's approach, a literature review is provided to contextualise and explore the research problem (Polit, and Hungler, 1999). The study used exploratory and explanatory research questions with the purpose of understanding what is going on, what the processes are through which non-compliance is experienced and how it could be improved. In so doing, an appreciation of the full nature of non-compliance was developed. As explained in Chapter 1, there has not previously been an investigation into the reasons for non-compliance of Advanced Life Support (ALS) practitioners with the guidelines and protocols of the Professional Board for Emergency Care Practitioners (PBECP) in South Africa. In fact, there has been little international research on this problem amongst emergency care practitioners. Therefore, since this is a study on a human phenomenon about which little is known, it is appropriate that it should be conducted in the qualitative paradigm (Mouton, 2001 :162).

The design of the study was based on the assumptions of the naturalistic paradigm as described by Polit and Hungler (1999:240). The researcher regards the ontology or nature of reality as being revealed by the practitioner's subjective experiences of non-compliance and constructed in their complex

world of lived experiences. The epistemology that is the relationship between the enquirer and those being researched, was based on an empathetic interaction between the researcher, the research assistant and the participants, the researcher and the research assistant both being ALS practitioners. This "relativistic" study collected data from a group of practitioners and was based on their perceptions, experiences and understanding of their practices as it relates to the research question. The researcher accepted that there is no one "truth" in the description of ALS practice. The axiology of the study was that the subjectivity of the results was inevitable and desirable. Methodology associated with the qualitative paradigm was used. The design was flexible and capable of being adjusted during the data collection. The focus was on understanding non-compliance as a whole in the context of ALS practice. Interpretations were grounded in the experiences of the participants. Narrative data was collected. This data was analysed and categories were identified based on the views and experiences of ALS practitioners as to the reasons for non-compliance with the PBECP guidelines and protocols. Through inductive reasoning relationships between the categories were identified to build a full conceptual description of the phenomenon. These were tested against the literature, refined and then checked against the data therefore a cyclical process of inductive and deductive reasoning was used.

The theoretical framework for grounded theory is based on sociology and derived from symbolic interactionism (Holloway and Wheeler, 1996:99). There is a focus on the processes of interaction between people and the behaviour and social roles that result when people interact with one another. A person in symbolic interactionism is active, creative and modifies social roles based on societal influences. Grounded theory places emphasis on the societal context within which people function.

The unit of analysis for this study was non-compliance of the ALS practitioner with the PBECP guidelines and protocols.

3.3. Study Setting

The setting for the study was the Western Cape Province of South Africa. The researcher and research assistant work in this area, and it therefore made access to the participants easier. Chapter 2 provides an overview of the health system in South Africa. There are both private and public ALS practitioners in the province that provide advanced life support to the 4.5 million people in the province (Benagh, 2005:83). The provincial government receives on average 40 000 emergency calls per month, the majority of which are for indigent patients. Patients with access to medical aid provide the bulk of the emergency calls to private ambulance services. There is no overall coordination of public and private services. Often both private and provincial services would attend motor vehicle accidents and major incidents together.

Emergency care training is provided by four private colleges. In 2003, the provincial government entered into an agreement with the Cape Peninsula University of Technology that resulted in the introduction of the National Diploma: Emergency Medical Care. Previously the provincial college conducted short course training up to advanced life support. The majority of practitioners that have the National Diploma: Emergency Medical Care qualification would have qualified and have worked in either Gauteng or KwaZulu-Natal provinces.

3.4. Population

The study population was the ALS practitioners residing within the geographical boundaries of the Western Cape Province of South Africa. There are 124 such HPCSA registered male and female ALS practitioners practicing in the public or private sector of this region.

3.5. Sampling Strategy

3.5.1. Sampling Methods

The selection process for the initial focus group discussion was purposeful in order to seek rich sources of information and included participants that may have alternate views to that of the researcher (Polit and Hungler, 1999:298).

The experience gained from the pilot focus group discussion as well as the researcher and the research assistant's knowledge of the population guided the selection of the initial participants. These participants included practitioners that were known to be experienced and knowledgeable in pre-hospital care. In selecting the sample, the researcher sought to achieve a sample that would be reflective of the ALS practitioners in the rest of the country so that the findings could be transferable to them. The researcher was able to do this as he has an understanding of the practitioners as a result of his work experience in two other provinces and of being the Chairperson of the PBECP, which involves regular interaction with ALS practitioners from all over South Africa.

Following the initial focus group discussion, snowball-sampling referral was used to identify other participants for further focus group discussions, who would provide rich and varied data (Polit and Hungler, 1999:297). The researcher specifically asked the initial participants to help identify other practitioners that they felt may provide insight on the research question. The intention was to include practitioners that were key informants and specific referrals as this would increase the scope and depth of the data obtained. Although the population size is small, the researcher and the research assistant do not personally or professionally know each member of the ALS population in the Western Cape. As Polit and Hungler (1999) note, a weakness of this snowball approach is that the eventual sample might be restricted to a rather small network of acquaintances. Moreover the quality of the referrals may be affected by whether the referring sample member trusted the researcher and truly wanted to cooperate.

Upon the completion of the focus group discussions, two semi-structured individual interviews were conducted. The sampling method for selecting the interviewees was also purposeful. Figure 1 illustrates the sampling process.

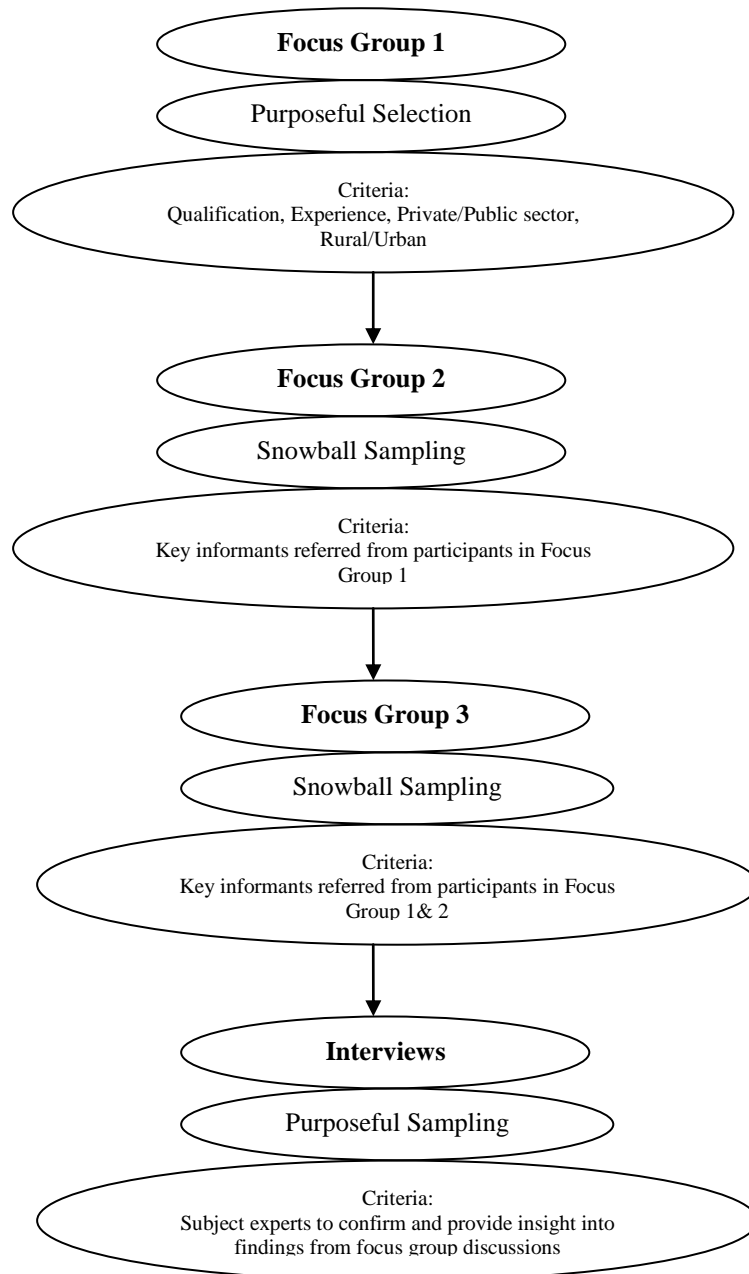


Figure 1. Sampling methods use in study.

3.5.2. Criteria for Selection

Selection criteria for inclusion in the study were registration as a paramedic with the HPCSA and current employment in either public or private sector emergency medical services. In addition, the researcher specified the preferred characteristics of the participants, these characteristics may have included one

or more of the following: an exposure to local, rural, national and international EMS experience; a range of ALS qualifications, practitioners closely associated with higher education programmes, those with short course qualifications who are not interested in further career development; and private and public sector experience. The sample was selected serially as the focus group discussions progressed. The two interviewees, for the individual interviews were selected, based on their knowledge, experience and positions in which they are currently employed, to confirm and provide insight into the findings that were emerging during the data collection and analysis.

3.5.3. Characteristics of the Sample

In keeping with the grounded theory approach, theoretical sampling was used (Terre Blanche and Durrheim, 1999). Therefore, decisions about what to collect and from whom to collect were determined by the emerging theory. Initially, maximum variations sampling was used to obtain the broadest range of information and perspective on non-compliance, hence the identification of the characteristics mentioned in 3.5.2. Thereafter, the two individual interviewees were selected to confirm or disconfirm the interpretative account.

Of the total group of twenty three participants in the focus group discussions, there were nine practitioners from rural services, nine from private Emergency Medical Services, thirteen practitioners hold the Critical Care Assistant qualification and seventeen have more than five years post qualification experience.

Table 1. The characteristics of the focus group discussion sample

Sector	Setting		Qualification		Length of Service	
	Rural	Urban	CCA	N.Dip: EMC	> 5yrs	< 5yrs
Public	6	8	11	7	9	7
Private	2	7	2	3	6	1
TOTAL	23		23		23	

Two discussions were conducted in two separate sites in the Cape Town metropolitan area. This is the area with the highest number of ALS practitioners and participants from Cape Town would provide an urban perspective on ALS practice. The town of George in the Southern Cape was selected as the third venue, as this town is in a rural area and participants were expected to provide a rural perspective on ALS practice.

The first interview was with a senior ALS practitioner that held the position of national EMS manager. The interview was used to clarify the categories that were emerging from the focus group discussions. The second interview was with a senior trauma surgeon that is the head of an accident and emergency unit. The second interview was conducted after the data analysis and sought to clarify the recommendations on how compliance could be improved.

3.5.4. Sample Size

Brink (1999: 131-145) explains that larger sample sizes do not necessarily result in a better result especially in qualitative studies where the type of sample is purposive or theoretical. Too many participants could have clouded the issues and overcomplicated the complex analysis process. For these types of research, the sample size is adequate when the meanings are clear and the data are fully explored.

Three focus group discussions were held in which a total of twenty three ALS practitioners participated. There were six participants in the first discussion and eight in the second discussion in Cape Town. Nine participants attended in George. As Burns and Grove (2001:425) explain, the ideal size of each group is between six and eight participants so as to encourage participation from all. Too many participants may limit the opportunities for 'quiet' participants to express their opinions. Too small a group may not stimulate discussion and obtain varied opinions.

It was evident after the third focus group discussion that little new information was emerging and the researcher and the research assistant arrived at the

conclusion that further focus group discussions were unlikely to reveal further new information. The findings of pilot focus group discussion were similar, and although these findings were not used, they did confirm what was said in the other focus group discussions.

In this regard it was strongly felt by the researcher that theoretical data saturation for this unit of observation had been reached by the end of the assigned data collection period. This data saturation was gauged by category development which appeared to be dense and rich and relations between categories were well established (Kelly, 1999:424).

In addition to the participants in the focus groups, two individual interviews were conducted. Therefore, the sample for the study was 25 participants.

3.6. Data Collection

There is a wide selection of data collection instruments available. Polit and Hungler (1999:312) identify self reports, observation and biophysiologic as three types data collection that are most frequently used in social research.

Primary data, in the form of self reports was used for the study. This was appropriate since the purpose of the study was to understand the reasons for non-compliance and ways in which it could be improved based on the views of the ALS practitioners themselves. Two methods were used to gather these self reports, namely focus group discussions and individual interviews.

3.6.1. Focus Group Discussions

3.6.1.1. Pilot Study Focus Group Discussion

A pilot study took place in KwaZulu-Natal on 2 September 2005. This discussion with six ALS practitioners drawn from the educational and operational sectors was moderated by the researcher and conducted under the supervision of the research supervisor. In addition to allowing the practical,

administrative aspects to be checked, the pilot study also demonstrated that the proposed method of data collection and tool were likely to yield the required data. In fact, the results of the pilot study were very similar to those of the actual study. However, they were not included in the findings. The pilot study was also used to ensure that the researcher had the necessary skills to conduct focus group discussions.

3.6.1.2. The Data Collection Tool

Focus groups were chosen as a method of data collection because according to Knodel (1993:36) the interaction between participants enables them to express their view of the world, beliefs and attitudes using their own words. During the discussion participants ask questions, which provide an opportunity for them to re-consider or re-evaluate their own understanding of their experiences they are particularly useful when a researcher wants to explore the degree of consensus on a given topic.

The discussion guide (Appendix 1) was developed and used by the moderator during the focus group sessions. It was pre-tested by having it checked by the supervisor and obtaining the approval of the Faculty Research Committee. It was further tested during the pilot study (see 3.6.1.1.). The discussion guide focused on four broad areas related to the research questions. Some of the questions were intended as a guide, so the order did not need to be followed and other questions could be asked to clarify what was being said or to probe further. The questions were based on the study undertaken by Moody-Williams et al. (2002) on the attributes of guidelines and protocols which were developed by a panel of experts in managed health care, quality improvement and emergency medical services. The panel used recommendations from the Institute of Medicine 2001 report in the formulation of the questions. The study was deemed to be relevant and applicable and therefore used to inform the discussion guide. Open-ended questions were used to stimulate useful trains of thought in the participants with the aim of establishing why non-compliance was occurring and how it could be improved. At no stage were participants directly asked about their own behaviour or situation with respect to non-compliance, as

this would have been unethical. Participants were encouraged to draw on their own experience which was useful in grounding the discussion in reality and served as a concrete referent when asked about what is typical or common. A participatory approach was taken during the discussions so the participants were made to feel valued in terms of their perceptions and experiences and they believed their contribution would play an important role in improving the situation.

In using the tool, both the researcher and the research assistant independently noted key points during the discussion. The key points were discussed privately with the research assistant after the focus group discussion and agreement was reached on the main points that had emerged.

The focus group discussion method and the guide were effective as lively discussion with a free flow of ideas occurred in each of the discussions. Furthermore, participants were clearly stimulated by the contribution from other participants in the group. During the focus group discussions some participants initially tended to dominate the discussions. However, the moderator intervened to minimise their influence without being prejudicial or partial to any particular participant.

Each of the focus group discussions were digitally recorded with the permission of the participants. These recordings were transcribed by the researcher and an electronic copy was emailed to each participant to check for correctness. Only two participants responded with corrections. These corrections were added to the transcripts.

3.6.1.3. Moderator and Observer

The research assistant, acting as the moderator, conducted the focus group discussions with ALS practitioners, whilst the researcher attended as an observer. The researcher's experience from the pilot focus group discussion was that it was difficult to observe and closely listen to what was being said while at the same time moderating the discussion. It is for this reason that the

research assistant acted as the moderator after being briefed by the researcher on the preferred technique to employ, as described by Knodel (1993). The researcher did ask clarifying questions where appropriate, that added to the discussion. The Faculty Research Committee had approved the use of a research assistant to act as a moderator should the participants object to the researcher because of his position as Chairperson of the PBECP. In fact, this was not necessary.

The research assistant is an educator in the Academy of Emergency Care at Cape Peninsula University of Technology and has passed a research methodology course as part of a Masters in Public Health degree. He was therefore regarded as being suitably skilled to act in this capacity. In addition, to moderating the discussion, the research assistant took brief notes as a further back-up to the digital recordings. There were no objections to the presence of the researcher, or the research assistant.

3.6.1.4. Place and Time of the Focus Group Discussions

The focus group discussions and interviews were held at mutually suitable times and venues. The discussions lasted an average of one hour and ten minutes. The venues were selected on the basis of suitability, availability and proximity of the venue to the participant's place of employment. Each venue had a circular boardroom configuration with the moderator seated at the head. This seating arrangement allowed maximal participation. The objective of the focus group discussion was achieved in that there was an in-depth examination of the issues stated in the objectives of the study.

3.6.2. Individual Interviews

The focus groups were complimented by semi-structured individual interviews which were used to explore and clarify findings that had emerged from the focus group discussions with individuals who have vast experience with ALS practice.

Two individual focused interviews were conducted by the researcher. Interviews involve verbal communication between the researcher and the interviewee, during which information is shared with the researcher (Baker, 1992:207). The semi-structured interview is more fluid and allows the interviewer discretion to move in productive directions (Seaman, 1987:290). The interviewer's function in the semi-structured interview is to encourage participants to talk freely about the topics on topic guide. The interviews were selected as a method to explore and probe findings that emerged during the data collection and analysis.

3.6.2.1. The Data Collection Tool

With the above in mind, and in preparation for the interview, the researcher made brief notes on the findings from the focus group discussion that needed further exploration. These notes formed the topic guide. The topic guide questions were open-ended and prepared so as not to be restrictive. The interview was seen as an interaction between the interviewer and the interviewee in which the interviewer has a general plan of inquiry but not a specific set of questions that must be answered.

All the formal interviews were digitally recorded. The recordings of the interviews were used to make transcriptions of the interviews. A copy of the transcripts was e-mailed to the interviewee to ensure transcript correctly reflected the responses of the interviewee.

3.6.2.2. Place and Time of Interview

An appointment was made with the interviewees and it was agreed that the researcher's office would be the best location for the interview to take place as it was quiet and allowed for privacy. The researcher provided the interviewee with the information guide and the consent form. The interviews lasted twenty minutes.

3.7. Data Analysis and Interpretation

The data was analysed using grounded theory methods of analysis, in order to produce a full conceptual description from the data. The researcher used the editing analysis style as described by Polit and Hungler (1999:574). The transcripts were read through several times in search of meaningful segments and units. The scrutiny of the data continued until the researcher was familiar with the content and had a good comprehension of the data. The transcripts were also read by the research assistant to obtain an alternate view. During this process, the research assistant identified a particular bias in the initial interpretation of the data by the researcher. The researcher had a bias in favour of the PBECP. After a discussion with the research assistant, and a careful critical review of the data, the researcher agreed with the observation of the research assistant which is reflected in the findings.

In synthesizing the data, categories were identified. The data was organised by key words and phrases followed by groupings of concepts into categories and then identifying major categories. In putting the pieces together the researcher got a sense of what was common and what were obvious variations. The categories and core categories were discussed with the research assistant. The hermeneutical circle (Kelly,1999:424) became evident as the relation of meanings of individual experiences and the meanings of categories that reflected the coherent ordering was revealed (Holloway and Wheeler, 1996). The meaning of the parts were considered in the relation to the meaning of the whole, which in itself can only be understood in respect of it's constitute parts. Initially eight major categories were identified.

The process described by Holloway and Wheeler (1996:101) was used. A schematic tree diagram of categories and subcategories was drafted. The schematic tree had topic headings linked to sub-headings. Brief summaries were made for the content of the discussion for each group concerning each topic, indicating, for example the extent of consensus regarding the topic and the direction of this consensus. Common subcategories were then regrouped and the categories revisited. There was immersion with the data that lead to open coding by constant comparison across the data until major categories emerged with their properties and dimensions. Five major categories eventually

emerged and a core category was identified. The coding of the data was done using colour highlighters with a corresponding code in the margin of the transcript. Microsoft Word[®] was used to cut and paste the text

Theorising of each category to seek alternative explanations was done with the assistance of the research assistant. The schematic tree was adjusted until the 'best fit' for the data could be found. The recontextualizing of the data was done during an interview with the trauma surgeon. The surgeon as the head of the accident and emergency unit develops and implements guidelines for this unit. The core findings and recommendations of the data were discussed in relation to use of guidelines in hospital accident and emergency unit and the researcher used inductive reasoning to identify patterns, threads and associations that were similar with the findings of the focus group discussions (Polit and Hungler 1999:575). A final revision of the major categories was undertaken with collaboration with the supervisor.

The accuracy of the interpretative analysis is enhanced if the analysts are intimately involved with the actual data collection (i.e. involved as moderators) as was the case in this study. This considerably reduced the distance between the analyst and subject being studied (Knodel, 1993:34-50).

3.8. Trustworthiness

Lincoln and Guba (1985 as cited in Polit and Hungler, 1999:426) suggest that there are four criteria for establishing trustworthiness of qualitative data. They include credibility, dependability, confirmability and transferability.

The data is credible when there is prolonged involvement, data triangulation and peer debriefing and member checks. The research supervisor checked the data and then the analysis and interpretation in order to protect against bias that may have arisen because the researcher is an ALS practitioner, the Chairperson of the PBECP and the Head of Department an Emergency Care department at an academic institution. Further checks were done by the research assistant who also assisted with the proof reading of the dissertation.

By virtue of the researcher's position, prolonged involvement has taken place. Data triangulation occurred when the findings of the focus group discussions were supported by the findings in the interviews. The findings on how compliance could be improved and the draft recommendations that arose out of the study were emailed to three colleagues that are situated in Johannesburg and Durban and who are responsible for the current review of the PBECP guidelines and protocols. The transcripts were emailed to participants of the focus group discussions and the interviewees to ensure that the discussion was accurately reflected.

Dependability refers to the stability of data over time and conditions. The data is confirmable if it is neutral and objective and there is agreement between two or more people about the data's relevance and meaning. The audit process fulfilled by research assistant and supervisor, reflective notes detailing decisions and conclusions during the data analysis support the dependability and confirmability of the data.

Transferability is the extent to which the findings can be transferred to other settings and groups. Ten of the twenty three participants have ALS experience in the other provinces in South Africa. In addition, the setting in the Western Cape Province can be replicated in any of the other eight provinces in South Africa. The sample is representative of the general South African ALS population, and peer review was undertaken by ALS practitioners that are located in Gauteng and KwaZulu-Natal.

According to Cormack (1991:161) reflexivity is an important concept with critical science as it recognises that the researcher is a part of the research process and there is therefore a need for the researcher to reveal their own beliefs and attitudes. Methodological openness was ensured when the raw data was made available and discussed with the research supervisor who acted as a second analyst. The researcher was aware of the social setting of the research and the potential for bias. The researcher, the research assistant and the research supervisor constantly strived to ensure that the researcher's position as Chair of the Professional Board did not influence the findings. There was at all times

awareness that the wider social context of the findings would be made available to the Professional Board with the purpose of improving emergency care practice.

3.9. Ethical Issues

There are three basic ethical principles that provide guidance to researchers: respect for persons, beneficence and justice (Brink, 1999:38).

The principle of respect requires that there must be respect for a person's right to self determination. Self determination means that individuals have the right to decide whether or not to participate in or withdraw from a study, without facing the risk of prejudice.

The principle of beneficence involves "doing good" for the participant and above all do no harm. Researchers must ensure that the person is not harmed physically, emotionally, spiritually, socially, economically or legally.

The principle of justice involves the person's rights to fair selection and treatment and their rights to privacy. Data must be collected with the participant's knowledge and consent. They also expect information collected from or about them to remain private. This can be done by making sure that the confidentiality of informants and the data that they provide is protected.

The major ethical issue with this study related to the researcher's position as Chairperson of the PBECP. It was essential that prospective participants not feel pressured to participate and that they believe that information that was divulged during the study would not be used against them or their colleagues. A participatory approach was adopted during the focus group discussions. Participants understood that the purpose of the study was not to identify deviant practitioners. To this end, the procedures for ensuring that participant rights were protected in this study included obtaining informed consent (principles of human dignity and justice), maintaining privacy through ensuring confidentiality (principle of beneficence and principle of justice) and a risk/benefit assessment (principle of beneficence).

Informed consent has three major elements: the type of information required, the degree of understanding required to give consent and the fact that the person has free choice in giving consent. To receive consent, the researcher provided participants with a written information sheet (Appendix 2), which contained a full explanation of the study and what was being requested of them. Participants were also informed that they were not obliged to participate and could withdraw at any stage. They were given an opportunity to read the information sheet and ask any questions before signing the consent form (Appendix 3) and participating in the study. None of the participants withdrew during the study and none of the participants declined to participate when approached to do so. Mechanisms to ensure privacy included the use of code names instead of real names and reporting group data only. Participants in focus group discussions also signed an undertaking to keep all information confidential. The digital recordings are stored in a password protected folder on the researcher's computer and will be destroyed after completion of the study to ensure confidentiality.

A risk-benefit analysis was conducted (Brink, 1999:37-51). The benefit of the study was its potential contribution of knowledge for the profession, and practical value to society to improve compliance. Participants benefited by gaining a better understanding of guidelines and protocols that will ultimately change through improved development and implementation processes. The potential risks relate to breaks in confidentiality. This was avoided through measures to ensure privacy. The benefits were regarded as outweighing the risks.

3.10. Conclusion

There was considerable debate, amongst colleagues at the initial Masters student meeting, on what methodology to employ to answer the research question. The choice of methodology and design was successfully tested during the pilot focus group discussion. Participants were eager to share their experiences and readily identified with the research question.

The methodology worked well as ALS practitioners that took part in the study all participated very willingly and openly admitted non-compliance even though this practice is not legal as it deviates from PBECP guidelines and protocols. The participants saw the study as an opportunity to add value to the ALS profession.

Chapter 4

4.0 Findings as to the Reasons for Non-compliance

The following chapter presents the findings for the first question of this study: the reasons why ALS practitioners are non-compliant with the PBECP guidelines and protocols. The data for the analysis was derived from the transcripts of the focus group discussions and interviews. Extracts from the transcripts were used to ground the discussion to the purpose of this study and explore the patterns that became apparent. Five major categories emerged from the analysis, namely the health system factors that influence non-compliance; the role of Emergency Medical Services; the PBECP guidelines and protocols; ALS practitioner education and training and evolution of Advanced Life Support practice. Each major category and its related categories and subcategories will be discussed separately. Thereafter, linkages between the different major categories and their categories will be explained.

The findings of the focus group discussions and interviews in so far as the views of rural versus urban practitioners, private versus public sector practitioners, the qualifications and experience of practitioners are similar and therefore are discussed collectively.

4.1. The Health System Factors that Influence Non-Compliance

As noted in Chapter 2, a health system includes all the components and activities, whose primary purpose is to promote, restore and maintain health (van Rensburg, 2004:2; World Health Organisation, 2000:5). This major category concerned a number of factors that were related to the components

and activities of the health system as a whole. Many of them are linked to the fairly recent establishment of Primary Health Care clinics and the provision of EMS to previously underserved rural communities.

4.1.1. Inadequate Clinical and Resource Support

There is inadequate clinical support provided by EMS medical practitioners to rural ALS practitioners. A disparity exists, in the provision of equipment and human resources, between the urban and rural health facilities. Although there may be shortages of equipment and personnel in urban areas, the availability of clinical support by medical practitioners and the shorter distances to hospitals minimise the effect of inadequate clinical and resource support. ALS practitioners that practice in the city identified the difficulties of rural areas. Occasionally practitioners from urban services undertake inter-hospital transfers from rural clinics and hospitals and it is on these occasions that urban practitioners are exposed to the inadequate resources that exist in rural areas.

4.1.1.1. Inadequate Support of ALS Practitioners by Medical Practitioners

EMS systems in Europe, the USA and Australia are dependent on medical practitioners to provide either on scene assistance or verbal radio directives to the attending Emergency Medical Technicians (Paramedics). The international resuscitation guidelines, that form the basis for South African practice, were developed for the context of direct clinical supervision by medical practitioners. The 2003 PBECP protocols and guidelines, however, no longer require the South African ALS practitioner to obtain prior approval from a medical practitioner to administer scheduled medications, terminate resuscitation attempts and/or perform invasive procedures. The move away from direct medical practitioner supervision is in favour of professional autonomy of the ALS practitioner and has been sanctioned largely due to the scarcity of medical practitioners to fulfil a clinical supervision role to ALS practitioners across South Africa. This change to independent practice occurred in 2001 (Justus, 2006). Despite this change, most EMS's still have a medical practitioner on 24-hour call to provide clinical support to the ALS practitioners, yet ALS practitioners

practicing in rural areas still felt unsupported in their practice. “In town the Doctor will meet you half way..., here [rural region] if the protocol says intubate the patient... you must decide” (P4). (Note: P4 is a reference to Participant 4)

In the following example described by Participant 13, the lack of specialist care in rural hospitals impacts on the pre-hospital use of the PBECP guidelines and protocols: “If you really go up to the Northern Cape or wherever, they don’t really have specialists and when you get there it is basically a primary call and you need to initiate the treatment and decide what you are going to do with this patient for the next 3-4 hours”.

The failure in the health system to provide adequate medical practitioner support to the practitioner creates a medico-legal and ethical dilemma for the ALS practitioner. The practitioner may reach the limitation of a guideline or protocol and would need permission from a medical practitioner to exceed the prescripts of the guidelines and protocols, as is required by the regulations governing the use of the PBECP guidelines and protocols. If there is no medical practitioner available to grant permission then the ALS practitioner is faced with a medico-legal and ethical dilemma.

4.1.1.2. Personnel and Equipment Shortages

Rural referring hospitals and clinics do not routinely have medical specialists and therefore these health facilities need to transfer the critically ill or injured to hospitals where specialist care can be provided. As a result of poor support systems in rural clinics and hospitals, patients are poorly prepared for transportation and it is not uncommon to find that the referring medical practitioner at the rural hospital is a junior, inexperienced community service practitioner. The ALS practitioner faced with this reality has to assume control, stabilise and transport the critically ill or injured to tertiary health care facilities that may be many kilometres away. An unstable patient will require close monitoring and possible drug infusions for pain or sedation for the duration of the road transfer that may last several hours.

Resuscitation equipment, such as ECG/defibrillators, is not universally available at hospitals. Although the vast majority (97%) of hospitals do have resuscitation equipment, it does not mean that these essential items of equipment are available in sufficient quantities when required. Neonatal resuscitation trolleys are less available in rural hospitals (15%) as compared to urban hospitals (10%) (Edwards-Miller, 1998:164). The rural ALS practitioner, because of the scarcity of resuscitation equipment in rural hospitals, may be called upon to resuscitate patients in the hospital using their own equipment, prior to transferring the patient to a receiving facility. The limitation of the drug dosages and indications for use of the PBECP guidelines and protocols may not accommodate these special circumstances of care.

Rural hospitals may not have a medical practitioner on duty 24-hours a day: "There is not always a doctor on duty at the rural hospitals" (P21). The medical practitioner will usually be on call. Poor communications from the scene of the incident may delay notification of the hospital of an incoming emergency patient. The ALS practitioner has in this instance to continue to resuscitate and care for the patient while waiting for the medical practitioner to arrive at the hospital.

Human resources are a critical component of the health system and account for two-thirds of the national health care budget. Problems in this area include the mal-distribution of personnel and insufficient and inappropriate training and education (Edwards-Miller, 1998:167). Organisations such as the Rural Doctors Association of South Africa actively recruit doctors to fill vacancies in rural hospitals and clinics in an effort to address these shortages. The availability of medical practitioners, that is the percentage of clinics visited by a medical practitioner to consult patients at fixed clinic facilities showed a decline in the Western Cape from 77% in 1997 to 66.7% in 2000 (Centre for Health Systems Research and Development, 2003: 49). Participants 13 and 21 suggested that the dosages in the PBECP guidelines and protocols are inadequate to support prolonged patient care that may be required due to the lack of resources within the health system.

4.1.1.3. Limited ALS Scope of Practice and Non-Compliance

The delay in clinical treatment of critically ill patients by medical practitioners prompted Participant 21 to present an argument for rural paramedics to be permitted to perform additional procedures. For example: "...we are taught ... pericardiocentesis – we should be allowed to do it because ... a lot of times that you get that [cardiac tamponade] on the scene". "...a tamponade does not take long to kill a patient. There is some of the stuff that we are taught that I think should be allowed on protocol". The practitioner in the above example has been taught a procedure that is not within the scope of practice as it is published in the PBECP guidelines and protocols (Appendix 4:93). The practitioner is faced with an ethical dilemma when confronted with a patient with a cardiac tamponade. Performing the procedure may save the patient's life but to do so is illegal as the practitioner will be non-compliant with PBECP guidelines and protocols.

The PBECP regulates the scope of practice of emergency care practitioners. The Basic, Intermediate and Paramedic practitioner's scope determines the procedures that may be performed by a practitioner holding a particular qualification. Basic non-invasive procedures, such as the recording of a blood pressure are within the scope of practice of a Basic practitioner. Procedures that are invasive and that carry to significant risk of complications are limited to practitioners holding an ALS practitioner qualification. Additions to the ALS practitioner's scope of practice, such as that proposed by Participant 21, may be considered by the PBECP if there is scientific evidence to support its beneficial use in the pre-hospital environment.

The ALS practitioner is taught to identify the signs and symptoms of a cardiac tamponade. This injury, which is most often caused by penetrating chest trauma, can rapidly become fatal. A pericardiocentesis (aspiration of blood from the pericardial sac) is advocated until such time that the patient can receive definitive care in an operating theatre. This skill is currently outside the scope of practice of a paramedic because the condition is difficult to diagnose in the pre-hospital environment and procedure is associated with dangerous

complications such as the laceration of the coronary blood vessels (Sanders, 2001:695). Participant 21 was the only participant that made the suggestion to include this skill into the ALS scope of practice.

The teaching of advanced skills to rural EMS practitioners proved unsuccessful in a study conducted to evaluate whether rural Basic Emergency Medical Technician's could be taught to perform out-of-hospital orotracheal intubation after didactic and mannequin training. The average success rate was 49%, (range 40% - 75%). Because the success rates were much lower than the historical success rates for paramedics (range 77% - 91%) the study was terminated early. The likely reasons for the poor success rate included inadequate training and inadequate skill retention with fewer than 1.5 intubations per year (Bradley, et al. 1998:27). It is likely that similar problems would occur if ALS practitioners were taught to perform pericardiocentesis.

4.1.2. Lack of Access to Continuing Professional Development

Rural practitioners have fewer opportunities to access continuing professional development (CPD) programmes as is clearly stated in the following extract: "The 2003 protocol has new drugs and I have not been updated because I'm in a rural area, I therefore don't have the insight to use the drugs" (P3). Similarly only 75% of rural hospitals in South Africa provide CPD programmes for their staff (Edwards-Miller, 1998:157). ALS practitioners that are employed in rural areas are not supported by the health system with regards to providing CPD programmes or access to internet based programmes. The distances that need to be travelled to access CPD programmes are great and can therefore be costly in terms of time and money. There could be an adverse impact on service delivery if several ALS practitioners simultaneously left a rural area to undergo CPD. However, the need for service delivery must be balanced against the potential harmful long term consequences of the attrition of knowledge and skills. The concern about the lack of access to CPD activities was shared by the majority of participants.

4.1.3. Conclusion

The health system creates a platform upon which delivery of services takes place. The health department has the challenge to deliver equitable, effective and efficient health care to all areas of the country. The participants identified lack of medical and infrastructure support and poor access to continuing professional development in rural areas as examples of how the challenges facing the health system influence the ALS practitioner's compliance with the PBECP guidelines and protocols.

Figure 2 below illustrates the influence of the health system as a whole on non-compliance. Inadequate resources and clinical support at the rural hospitals and clinics creates a need for an expanded ALS scope of practice. There is insufficient clinical support provided by medical practitioners to ALS practitioners in rural areas. The shortage of equipment and personnel in rural clinics and hospitals impacts on their practice and the PBECP, ALS scope of practice does not accommodate the specific needs of rural ALS practice. Health Professionals that work and live away from the metropolitan cities have fewer opportunities to access continuing medical education.

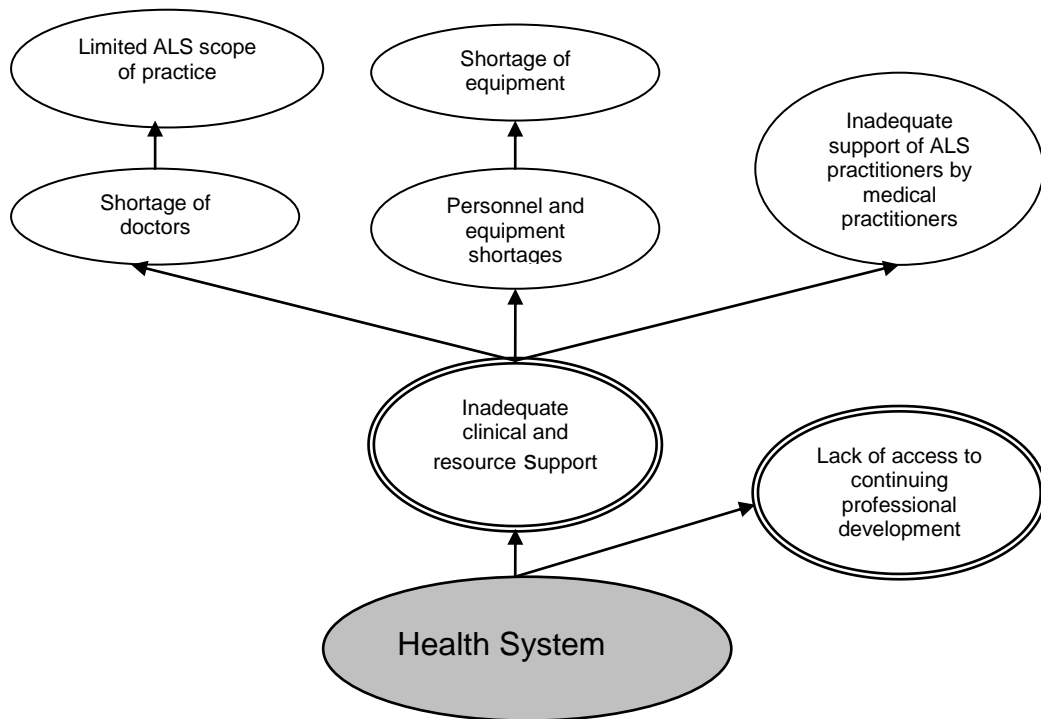


Figure 2. The health system factors that influence non-compliance

(Note: In diagram, the major category shape is shaded, the categories have a double outline and sub-categories have a single outline. This also applies to all diagrams that follow.)

4.2. The Role of Emergency Medical Services in Non-compliance

As explained in Chapter 2, Emergency Medical Services (EMS) must receive and respond to emergency calls, provide emergency medical care and rescue services and transport the ill or injured to appropriate medical facilities. EMS is responsible for the development of policy, protocol, clinical governance and quality management as it applies to the provision of emergency care and rescue services. ALS practitioners are employed by EMS to provide advanced life support care to the critically ill or injured. In this regard, factors related to EMS influence non-compliance with the protocols and guidelines. The categories identified within this major category concerned communications, distances to hospital, medical practitioner advice and limited issue of drugs. These are explained hereafter.

4.2.1. Poor Communications

Voice communication is the essential lifeline for any modern EMS, particularly with respect to obtaining clinical support. “Because of the rural geography there are no cellular phone and radio communications and whatever actions you take there will determine the outcome of your patient” (P21). Radio and telephone communications to get advice from the medical practitioner on call may not be possible because of a lack of blanket two-way radio or cellular phone coverage in the Western Cape Province. Essentially practitioners are isolated and faced with caring for critically ill or injured patients who may require some sort of clinical intervention that is specifically not covered by the protocol. This is reflected in the reference by Participant 4 to being the “alpha and omega”, implying that in these conditions the patient’s life is in the hands of the practitioner.

“If there is a problem with the patient or the patient needs medication.... It complicates your work because a lot of times you decide what to do, that is, go above your protocol” (P4). Under these circumstances where communication to get advice is not possible, practitioners are forced to exceed PBECP guidelines and protocols in an attempt to continue to provide the best possible care under these circumstances. ALS practitioners may encounter situations in which the recommended maximum dosage is not efficacious because the patient has developed a tolerance to the drug and the half life of the drug is reduced (Hassan, 2006).

The sentiment of the participants is endorsed in the 1998 South African Health Review that identified that communications essential for the management of emergencies is an ongoing problem, especially for rural clinics. Nationally, 62% of clinics have working telephones while 30% reported two-way radios not working (Edwards-Miller, 1998:162).

Similarly, de Villiers (2006) reports that approximately 90% of the Western Cape Province has EMS two-way radio coverage. The private sector coverage is limited to the large metropolitan regions and private sector ALS practitioners are dependent on cellular phone communications to obtain medical direction. Cellular coverage is limited to the national road routes and towns.

Access to a telephone is essential to ensure that rural clinics can summon the assistance of an ambulance to transport critically ill or injured to hospital as well as obtain clinical advice and facilitate the day to day administration that is so essential for any health facility. The ALS practitioner may arrive at a clinic located outside two-way radio coverage and be unable to get medical advice from the EMS medical practitioner because the clinic does not have access to a two-way radio or telephone. EMS, in executing its mandate to provide quality emergency care, is responsible to ensure that effective communication systems are in place to support the ALS practitioner.

4.2.2. Long Distances to Hospitals

Distances to hospitals in rural Western Cape are vast. These distances, coupled with poor road conditions and poor mechanical condition of ambulances, can compound the travelling time to an emergency call and from the place of the incident or clinic to hospital. The average distance from a fixed clinic to the nearest hospital in the Western Cape is 14 kilometres as compared to the national average of 29 kilometres (Centre for Health Systems Research and Development, 2000: 41). The distances from the patient to the clinic are unknown. The majority of clinics, 88% of urban clinics and 77% of rural clinics, do not have their own transport and rely on ambulance services to transport patients in an emergency (Edwards-Miller, 1998:164).

The national emergency average response time is significantly greater for rural clinics (1.6 hours) as compared to urban clinics (0.9 hours). In the Western Cape, 77% of clinics had an emergency response time of less than one hour in 1998 (Edwards-Miller, 1998:164).

The greater the distance from hospital, the longer the period of time that the Emergency Care Practitioner (ECP) has to provide care to the patient in the ambulance. The following statement by Participant 4: "...here you are 500km away from a doctor" illustrates the additional burden placed on rural practitioners who have to provide sustained care to patients who may be hours away from a Level 2 or 3 hospital.

4.2.3. Medical Practitioners Advice to ALS Practitioners May Not Conform with Guidelines and Protocols

Medical Practitioners have been involved in EMS since its inception. Prior to the establishment of the Professional Board, the medical practitioner as the head of Emergency Services assumed medico-legal responsibility for the practice of ALS practitioners. Since the establishment of the Professional Board and of ALS practitioners subsequently becoming independent practitioners, the role of the medical practitioner has become that of clinical supervisor (MacFarlane, Van Loggerenberg, and Kloock, 2005:145).

What emerges from the participants is that the advice given by the supervising medical practitioner does not always conform to the PBECP guidelines and protocols and encourages non-compliance as is the case in this extract: “Lasix[®]... there is a max dose: how many times you call the medic and they [medical doctor] will say give him double that...” (P21). This suggests that the medical practitioner that is issuing the instruction may not be familiar with the PBECP guidelines and protocols or is not concerned with the side effects that may result, as in this example, hypotension from the Lasix[®] administration (Health Professions Council of South Africa, 2003).

The medical practitioner that gives advice to the ALS practitioner assumes medico-legal responsibility for the clinical instruction that is issued. However, a concern raised by Participant 4, is that the advice given by the supervising medical practitioner is outside that of the PBECP guidelines and protocols and is not recorded for medico-legal and quality purposes: “...what bothers me sometimes is the doctor may be busy with another patient and he says: yes, do that... and how does that cover you? None of that conversation is recorded”. This practice exposes a possible medico-legal risk if the conversation between the medical practitioner and the ALS practitioner is not recorded.

Participant 18 highlights the inconsistency of how different medical practitioners in different parts of the country interpret the PBECP guidelines and protocols. “Dr X in Pietersburg will say you must comply with the protocol and a Doctor in Cape Town will say you will exceed your protocol as long as it’s the best outcome for your patient”. This inconsistency encourages differing practice standards that may not only vary geographically but also vary between medical practitioners employed in the same EMS.

In the following example, the advice of the medical practitioner although outside the recommendations has a positive outcome: “Even [with] Soda Bic [Sodium Bicarbonate] there seems to be a lot of controversy around its use.” “Recently I had a resuscitation and the patient was hypoxic for a while before CPR was started”. “One of the doctors was on scene [advised to administer Sodium Bicarbonate]”. “...it reversed the acidosis and was quite effective: we did get the

patient back” (P12). In this instance, Participant 12 noted the controversy around the use of Sodium Bicarbonate. This experience, without careful reflection, could have caused future indiscriminate use of the drug even though the literature clearly states that there is no data that confirms that treatment with buffer agents improves outcome, and in fact, intravenous bicarbonate may produce intracellular acidosis that damages cardiac or cerebral tissue (Vincent, 2003).

There is no evidence to suggest that the clinical advice offered by supervising medical practitioners in EMS has worsened the outcome of the patient as is mentioned by Participant 19: “...the doctors haven’t read our protocol so their advice might be outside of the protocol”. “But I think it is seldom to the patient’s detriment”. This statement by Participant 19 was corroborated in an interview with Participant 25, senior medical practitioner, who stated that in the case of certain drugs non-compliance would not necessarily be detrimental to the overall outcome of the patient. The repeated disregard for the PBECP guidelines and protocols by EMS medical practitioners may diminish the credibility of the guidelines and protocols contribute to the ALS practitioner’s non-compliance.

4.2.4. Limited Drug Issue

Participants practicing in both the public and private sector EMS said that their employer did not issue all the drugs listed in the PBECP guidelines and protocols. “... they only started to give Morphine at the beginning of the year and they still don’t have Amiodarone...” (P11). The drugs that are unavailable commonly include Amiodarone, Flumazenil and Morphine.

Limited access to drugs may encourage practitioner non-compliance as alternative, possibly less effective drugs are administered or drugs are used for inappropriate clinical conditions. “The employer is a major cause for non-compliance because you don’t have what your protocol stipulates for you to use or you have a different drug to what the hospital is going to use then they [the

hospital] complain why did you start with the Lignocaine we want to give the patient Amiodarone”(P10).

When asked about having had patients that needed an unavailable drug, the response was in the affirmative and in reply to how that made the practitioner feel, the response was: “Nothing, it’s something I accepted, that it’s not available” (P6). Participant 7 in response said: “But we also carry alternative drugs”. In part the blame and responsibility for the practitioner using ‘less effective’ drugs is apportioned by the practitioner to the EMS organization.

Access to drugs such as Amiodarone and Annexate[®] [Flumazenil] is limited both in the public and private sector and encourages theft of drugs from hospitals by ALS practitioners. “...we have one ampoule of Annexate[®]”. “I don’t know how we get it but we have it” (P15). This suggests that the drug was illegally or improperly obtained. Participant 11 admits to the unauthorised acquisition of drugs from hospitals: “I just get it from the doctors or the hospitals, the drugs that I needed”. Participants 6 and 13 also cited Flumazenil as the drug to which they do not have access.

The concern of Participant 16 is that this practice amounts to theft of drugs from hospitals: “It does bring about a negative side and I picked up on scavenging, unfortunately we’ve had one or two instances...”. “You take an ampoule of Etomidate out of a hospital is actually stealing, it’s a criminal offence and it leaves your service liable which at the end of the day leaves you liable...”.

The primary reason given by Participants 6 and 13 for not having Amiodarone is the cost of the medication: “Amiodarone is not available due to expense” (P6). Another reason offered by Participant 4 is that the person responsible for purchases does not see the clinical need “The people in charge of the service and of making a decision are not paramedics so they don’t see the need for it”. Strategies of expenditure control in the public services and profit growth in the private sector influence the culture within the EMS organization and may negatively impact on quality of care.

Limited access to schedule seven medications, that is prohibited substances such as morphine, may have to do with a lack of trust by management or fear of management that the drug would be abused by the practitioner: "I think that they don't trust us" (P15). "Services don't want to buy it because of previous bad experience". "They might have someone abusing the drug" (P18). Morphine is derived from opium and can be synthesised to form heroin (Narconon, 2006).

Participant 16 understood the context of limited access to drugs across the health sector: "...it is a generic problem across the entire medical services in this country". "You find ...that ICU [Intensive Care Unit] doesn't run on a certain drug it's too expensive...". A survey of the availability of drugs in South African hospitals showed that of a sample of 25 drugs listed on the Essential Drug List, not all the drugs are universally available in the majority of hospitals (Edwards-Miller, 1998:171). For example, only 85% of hospitals surveyed had Morphine Sulphate although it is relatively cheap.

The employer can be held vicariously liable should a patient come to harm because of non-compliance. The principle of vicarious liability is an anomaly in South African law because it imposes strict liability on an employer for the derelict of its employee in circumstances in which the employer is not itself at fault (Deneys Reitz Case Law Update, 2003). Participant 21 felt that non-compliance would be viewed as a serious offence by the employer and that it would lead to dismissal: "I've seen the things that people were fired for in the last month and that [protocol deviation] is not even going close".

4.2.5. Conclusion

The core business of the EMS is to improve the quality of emergency care delivered to the population of South Africa thereby decreasing morbidity and mortality (Harambe Institute, 2002). Organisational issues that support this purpose include improving resource mobilization and management of resources without neglecting the attainment of equity in resource allocation. Human resource management and development must be improved, as must include communication and consultation within EMS and between the service and the communities served.

EMS is the environment where ALS practice occurs and therefore has a direct influence on ALS practice. This major category concerns the role that EMS plays in ALS non-compliance with the guidelines and protocols. Figure 2 depicts its categories and subcategories.

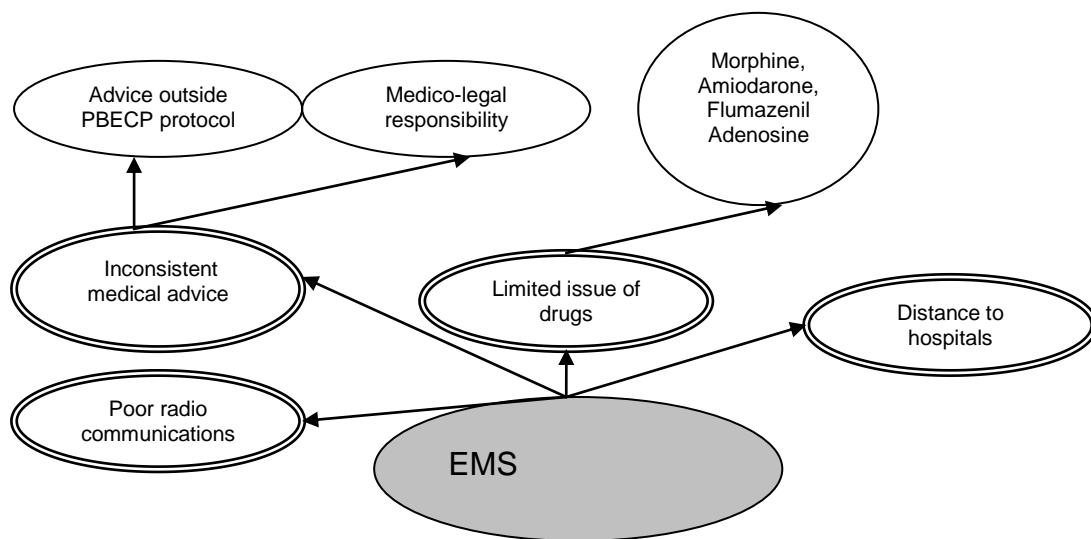


Figure 3. The role of EMS that leads to non-compliance

In conclusion, there is a strong suggestion that emergency medical services do not support practitioners practicing in rural areas. The delivery of high quality emergency care in the rural setting requires an infrastructure quite different from urban or suburban environments given the limited resources in that setting. Practitioners may face environmental obstacles in the form of distance and terrain, as well as a lack of resources that makes communication and primary access to the patient difficult. Application of the latest evidence-based emergency medical practice may not be possible because of a lack of resources and infrastructure. Limited access to drugs based on perceptions about potential drug abuse by practitioners, advice of medical practitioners that is inconsistent with the PBECP guidelines and protocols and inadequate clinical quality control, all contribute to non-compliance.

4.3. PBECP Guidelines and Protocols

The PBECP regulates the scope of practice and publishes protocols and guidelines to which ALS practitioners are required to adhere. The protocols and guidelines list the capabilities, the protocols and ethical rules that govern ALS practice. Not surprisingly, issues associated with the PBECP guidelines and protocols emerged as a strong category in relation to the reasons for non-compliance. Specific drug protocols were identified as being problematic.

4.3.1. Confusion about the Understanding and Use of Guidelines and Protocols

An important finding concerned the use and understanding of the terms 'guideline' and 'protocol'. This confusion exists in the PBECP documents, and the terms appear to be used interchangeably. In addition, and probably as a consequence, participants were unclear on the difference between a guideline and a protocol and if and when they could deviate from the guidelines and protocols.

The Minister of Health has, in terms of section 50(2) of the Medical, Dental and Supplementary Health Services Professions Act, 1974 (Act No. 56 of 1974) as amended (Amendment Act, No. 1 of 1998), approved the rules that state that a performance by a paramedic of any professional act other than those set out in protocols approved by the professional board and the council, except at the written direction or responsibility of a registered medical practitioner, is otherwise illegal. However, the introductory notes in the PBECP guidelines and protocols state that the document serves as a guideline and does not replace sound clinical judgment (Health Professions Council of South Africa, 2003).

The PBECP guidelines and protocols are not clear as to what a protocol is and what a guideline is. The words 'protocols', 'standards', 'recommendations' and 'guidelines' are used in the notice on pages two and three of the booklet without explanation (Appendix 4:3). The front cover says: "Protocols" and on page 3 the statement reads: "These documents are intended to serve as guidelines..." (Health Professions Council of South Africa, 2003). In the general discussions it

was apparent that practitioners were unclear as to if, how and when deviation, from the prescripts contained in the PBECP guidelines and protocols, was permitted. Participant 21 reflects that a lot of ALS practitioners do not see the document as a guideline: “Let the protocol be a guideline - lot of practitioners don’t see it as a guideline, they see it as this is the law; the Bible says you will give 40[mg] and no more”. In the view of Participant 21 the dosages stipulated in the guidelines and protocols are just a guide to be followed at the discretion of the practitioner.

Regulation 1379 (Appendix 4:115), pertaining to the ALS practitioner, does clarify when a practitioner may deviate. It states that the performance of professional acts by a paramedic practitioner other than those set out in the protocols approved by the professional board and council is not permitted, unless at the written direction and under the responsibility of a registered medical practitioner or in the case of oral conditions, a registered dentist (Health Professions Council of South Africa, 2003). Therefore, the PBECP guidelines and protocols, in so far as the regulations are concerned, are protocols as they prescribe the maximum dose, indications, contraindications and precautions for the drugs within the scope of practice of the ALS practitioner. An algorithm for common emergencies, that essentially contains a detailed plan on how the medications should be administered, is also provided. The independent practitioner can independently decide to implement the protocol and can only deviate from the protocol under the direct instruction of a medical practitioner (Health Professions Council of South Africa, 2003).

Participant 13 understood that a court of law would measure practice against what is stipulated in the PBECP guidelines and protocols but was unclear as to how much deviation would be acceptable: “...if something goes wrong, you’ve treated your patient and ...that ends up in court”. “You have now under your independent practice, protocol is a guideline, whole story, deviated a bit from the protocol and now the attorney is pulling you to pieces, now how does that stand in court?” “Do they go strictly according to these are the protocols, these are the guidelines you have to do it according to that...?” “...I’ve spoken to a lot

of people.... [they are] scared to deviate out of their protocol...". This again points to a lack of clarity about how to interpret the guidelines and protocols.

The Regulations (Regulation 1379 of 1994) published in the PBECP guidelines and protocols provides the legal basis for the use of the PBECP guidelines and protocols yet Participant 18 was unclear as to what the legal ramifications would be if the protocols were breached and suggests his professional actions may be covered by the Good Samaritan legislation (Health Professions Council of South Africa, 2003). "...what will the HPCSA use to counsel you"? [In South Africa the] "...Good Samaritan law still applies". "... in the USA paramedics apply it [guidelines and protocol] to the tee otherwise they run the risk of been sued". Good Samaritan legislation affords protection to the public that come to the assistance of a fellow citizen in need and does not afford protection to a professional person whose duty it is to render emergency care. ALS practitioners are specifically excluded from this protection by the HPCSA, Ethical Rule 28 which makes provision for any other health professionals to perform any act in an emergency situation (Health Professions Council of South Africa, 2003).

4.3.2. Legitimacy of PBECP Guidelines and Protocols

The practitioners acknowledge the legitimacy of the Health Professions Council of South Africa and the PBECP as a statutory body with a legal mandate to regulate ALS practice. Twelve Professional Boards, including the Medical and Dental Professions Board and the Professional Board for Emergency Care Practitioners operate under the jurisdiction of the HPCSA (Health Professions Council of South Africa, 2004).

The statement by Participant18 is an example of how the legitimacy of the PBECP guidelines and protocol is used by practitioners to support their practice: "... because the protocols help to give credibility to my actions..., for example by insisting on the patient being intubated prior to transportation". "It's a written document from the HPCSA and therefore supports the paramedic's actions and/or requests". Annexure 15 of the Ethical Rules (Health Professions

Council of South Africa, 2003) states that the ALS practitioner must follow the protocols approved by the PBECP and HPCSA, except under the written direction and responsibility of a medical practitioner. PBECP guidelines and protocols provide algorithms for commonly encountered emergencies. The step-by-step sequence of the algorithms lists airway management as the third step in the sequence, following scene safety and patient responsiveness. In the example above, tracheal intubation is necessary to secure the patient's airway. It is within the ALS practitioner's rights, as stated in the ethical rules, to request a written instruction from the medical practitioner if his proposed management conflicts with that of the medical practitioner. The medical practitioner in issuing a written instruction then assumes medico-legal responsibility for the patient.

The PBECP guidelines and protocols are used to defend their clinical decisions when questions are raised by other health care professionals, as is stated: "We did show - look it is in our protocol - and that also helps in a way but after a long argument" (P15). What also emerges is the obvious tension that exists in the environment in which the practitioner practices. The practitioner has to defend the clinical decisions and choice of patient management when handing over the patient to medical practitioners and nurses at hospital. The HPCSA will arbitrate, should the need arise, in disputes between Professional Boards that fall under its jurisdiction (Health Professions Council of South Africa, 2004). To avoid confrontation with other health professionals the practitioner may be inclined to ignore the PBECP guidelines and protocols in favour of local guidelines.

4.3.3. Use of Guidelines and Protocols

Carefully written and properly used, the PBECP guidelines and protocols may limit and control the risk of liability. They provide an expectation that is known in advance of any patient encounter and therefore are used to keep the patient and the practitioner safe.

The following statement reiterates the benefit of having PBECP guidelines and protocols: "I think the protocol is an excellent tool to keep the practitioners safe". "The dosages and drugs, some say we don't have enough drugs others say we have too much, but it keeps us safe". "It's a recommendation and guideline" (P7). This statement is supported by Participant 10, who, in response to the dosages states: "...that's like a cockroach dose". "... Made to protect us from being sued... [and] lends a bit of safety as well". The reference to 'cockroach dose' implies that the dosage was only enough to work on a cockroach. It shows insufficient knowledge of the therapeutic index of the drugs in use, where the therapeutic index measures the therapeutic value of the drug by measuring the useful dose to the toxic dose. (Penn, 1980:36.)

This view is contested by Participant 2: "In my view they are too simple to add value". "It's safe but very limiting". Participant 2 has the view that there is insufficient information provided to keep the practitioner safe. Clinical situations are by their very nature complex. To deal with all the levels of complexity in a guideline and protocol would be impractical, but on the other hand to oversimplify it would not represent the reality and therefore prove it to be irrelevant (Cantrill, 1992: 507).

The protocol is seen to benefit the practitioner, for if a practitioner meticulously follows the guidelines and protocols the patients would be safe from harm and the paramedic would therefore be protected from litigation. Although the dosages are safe to use, that is the possibility of severe side effects are minimised, the experience of the practitioners is that the dosages are not effective. Non-compliance occurs when practitioners administer higher 'unsafe' dosages to obtain the desired effect; for example Midazolam for sedation.

4.3.4. Problems Related to the Process of Protocol Development and Implementation

Guideline and protocol development requires that the information contained therein is correctly interpreted and translated (validity); that another group of developers given the same information would produce a similar result

(reproducibility); that there has been consultation across the profession (representativeness) and that the process used must be transparent (Schwartz, et al. 1999:1155-1156). Subcategories in this category indicate problems related to these criteria. The development of the PBECP guidelines and protocols using these criteria may result in greater acceptance of the standard and an added benefit should include a greater degree of compliance.

4.3.4.1. Lack of Consultation

Participant 3 acknowledges the benefits of consultation in this extract: "...there needs to be some sort of projected changes so that when new guidelines are released it doesn't come as a surprise". "Then everyone knows that this book is going to change given sufficient evidence and research". The value of ownership and buy-in to the process and outcomes cannot be underestimated according to Schwartz, et al. (1999:1157). They explain that to be effective the consultation must be both narrow and wide. Narrow consultation will include a group that is respected within the ALS practitioner community for their expertise. Wide consultation will include not only the practitioners but also subject specialists and organisations that play a role in the provision of emergency care. The use of electronic media such as the internet, as a tool to undertake wide consultation, is advocated by Participant 1: "...when there is a protocol change...the profession should have changes discussed in...an interactive website where all practitioners can have input and not only pre-hospital care practitioners but [also] the doctors". The major limitations to consultation would include the cost of the exercise and the time it would take to consult extensively.

4.3.4.2. No Updates of ALS Practitioners

For the guidelines and protocols to impact on clinical practice the PBECP would need to disseminate information on the changes. "If they [PBECP] are changing the protocol, set up meetings or send out brochures to the base, if you don't have time to come this is what is going to change" (P12).

4.3.4.3. Lack of Face Credibility

The credibility of the PBECP guidelines and protocols is called into question by Participant 22 when an attempt was made to reference a statement: “We challenged one of the statements and could not find the answer and that became a problem”. “Credibility is important”.

The importance of referencing within the document is emphasised by Participant 22: “...we do need a line saying where the information comes from, a reference or website with additional information that adds value to the credibility of the document and so it really just empowers us to say if you want to challenge my protocol, this is where I got it from”. Participant 1 supports the need for the PBECP guidelines and protocols to be referenced: “...the development of the protocol itself, I’m not sure that we are actually empowering the practitioner with enough information... coupled with a change in the protocol they should [provide] adequate [reference] reading where the practitioner... [can] substantiate why we are using this infusion”. “This doesn’t come through with the protocol changes”.

The suggestion of referencing the PBECP guidelines and protocols is useful as it grounds the document in a scientific context and provides opportunities for further reading and insight on the recommendations contained in the PBECP guidelines and protocols (Schwartz, et al.1999:1156).

4.3.4.4. No Scheduled Review Date

To cope with the ever changing landscape, Participants 6 and 15 identify the need for an annual review of the PBECP guidelines and protocols: “Protocols need to be revised every year” (P6). “...the people that write the protocol don’t update the changes... I’m stuck with the protocol that Amiodarone is contraindicated in children”. “In some literature it’s not”. “They haven’t changed anything” (P15).

This view is shared by Participant 15: “They [the Professional Board] haven’t changed anything [in the protocol]. When I was taught at the college I was taught differently”.

4.3.5. Conflict with Other Guidelines

Participants' experiences showed that the PBECP guidelines and protocols conflict with what is practiced in hospitals, with clinical advice that is provided by medical practitioners in hospitals, and with the content of nationally and internationally recognised literature. Participants would witness drugs being administered in hospitals without consideration for the maximum dosages prescribed in the PBECP guidelines and protocols.

The PBECP guidelines and protocols are not supported by what is contained in the drug package insert (Sanofi-Synthelabo, 2004). In this instance the concurrent use of two anti-arrhythmia agents is not supported in the PBECP guidelines and protocols but no mention of this exclusion is contained in the drug package insert (Health Professions Council of South Africa, 2003). “The protocol says you can’t give Amiodarone because it is another anti-arrhythmia drug ...the protocol says to you that you must continue with Lignocaine despite what the evidence says to the contrary”. “The protocol is not supported by even the manufacturer’s notes” (P19).

In instances where there are varying opinions, as is the case with fluid replacement, the PBECP guidelines and protocols do not provide sufficient evidence to support their recommendations: “I just think the protocols should look more in-depth at fluid challenges because everywhere you go there are different thinking and regimes around permissive hypotension” (P8).

The PBECP guidelines and protocols appear as a rigid inflexible document for some of the drugs and this inflexibility impacts on the clinical decision making of the practitioner. An example is the contraindications of Aspirin, provided by Participant 19 (Health Professions Council of South Africa, 2003). “Aspirin [is] contraindicated for asthma...[but] has proven benefit if the patient is having an

MI [myocardial infarction] and it's not uncommon for a patient to have asthma in his medical history, so ... we might withhold the aspirin when that is not really a problem". "The protocol doesn't make any allowance for that".

4.3.5.1 Conflict with Hospital Practice

There is a difference in the hospital recommended drug regimes and dosages and those in the PBECP guidelines and protocols: "...a colleague came under fire for giving Dormicum[®]." "She wanted to know how you can give this dosage of Dormicum[®]" (P15).

In the following extract Participant 13 faced humiliation by hospital staff for following the recommended PBECP guidelines and protocols for adrenaline infusion: "...you put up an adrenaline infusion post cardiac arrest and you get to hospital the doctors are laughing at us, with your 1mg in your 200ml saline, they really are laughing at us".

Guidelines practiced by individual specialist medical practitioners within a hospital setting may differ not only with the PBECP guidelines and protocols but with other guidelines such as those contained in the SAMF: "[I] went to Dr R and told him that we give 6mg, 6mg and 12mg of adenosine." [He said] "...they will use much less and 6mg in his opinion 6 mg is a hell of a lot". "So in that instance you are overdosing in his opinion as a cardiologist, yet the SAMF also recommends 6mg,6mg,12mg, so that doesn't leave us anywhere" (P19).

Participant 13 expressed concern that other health care providers did not know what the scope of practice of the ALS practitioner was and particularly what was contained in the PBECP guidelines and protocols: "...the people in the hospital and the casualty have got no idea what we can and can't do...". "...the anaesthetist was absolutely gob smacked that we could intubate and use Dormicum[®]". "Every time I've done an ACLS [Advanced Cardiac Life Support] or PALS [Paediatric Advanced Life Support] course with doctors and nurses they were flabbergasted that, that was our protocol, they couldn't believe it". "After that they would see me and treat me with so much more respect".

It is accepted that to effectively manage emergencies requires a coordinated approach within the hospital. Clinical guidelines for good resuscitation practice are needed, to ensure that the equipment is functioning, drugs are available and that hospital staff are trained to maintain and upgrade their knowledge and skills in resuscitation. A significant proportion of hospitals, 25% rural and 14% of urban hospitals did not have a protocol on resuscitation (Edwards-Miller, 1998:45).

4.3.6. Preference for Other Guidelines

Information that the practitioner reads in other literature such as the South African Medicines Formulary may differ from the information in the PBECP guidelines and protocols: "It is confusing reading. A lot of the information given is contraindicated in other books" (P7).

The integrity of the PBECP guidelines and protocols are questionable in the view of Participant 22: "...the influences that we have in emergency medicine are the AHA [American Heart Association], the SARC [South African Resuscitation Council], the SAMF [South African Medicines Formulary] and then we get our protocol book. You are then bound by these guidelines as a safety measure but the integrity is so challenged it forces people to go beyond". The examples cited by the other participants do support this statement but not to the extent described by Participant 22.

4.3.6.1. Preference for South African Medicines Formulary

The foreword of the South African Medicines Formulary (SAMF) states its purpose as being to bring clear and accurate guidelines for safe, rational and cost-effective use of drugs commonly used by health professionals in South Africa. The SAMF has become a benchmark of good practice and is cited in courts of law and by those responsible for drug policy (Gibbon, 2003).

The use of the SAMF is repeatedly advocated by the participants in the focus group discussions. Participant 15 was of the opinion that the universal use of

the SAMF would reduce conflict amongst health professionals. "...there are sometimes slight differences with the protocol and the SAMF". "The SAMF is used universally across ... health [departments] and it's [use] will help us because it will reduce the arguments and fighting". This would support the need for a nationally standardised practice guideline document.

Participants 15 and 7 would trust the information in the SAMF above that of the PBECP guidelines and protocols. When asked which drug information they rely on, the response was: "I use the SAMF and this would supersede the protocol" (P15). "The extended reading of it is in the SAMF which offers more information. I would trust more what the SAMF says than what the protocol says" (P7).

When asked, Participant 18 agreed that the SAMF should replace the PBECP guideline and protocol and reiterates that the protocol is a guideline implying that the SAMF information is more precise and accurate. "Yes, the [PBECP] protocol is a guideline".

The SAMF is regarded as being more comprehensive by Participant 2, 22 and 11 "...read SAMF it's got all the information" (P2). "It [protocols] contrasts all the other documents such as the SAMF that is used in hospitals now days and we pre-hospital practitioners are bound by this [protocol]". "The SAMF covers the range of medications" (P22).

The additional information provided in the SAMF could influence clinical practice by helping the practitioner to identify and eliminate contradictions to the drug use: "...the protocols have contraindications, indications and absolute contraindications, ... [the] SAMF and ...BMF [British Medicine Formulary] they say you can give it ...the contraindications you can [rule out] ...but they don't make provision in the protocol book for those things" (P11).

4.3.6.2. Preference for the American Heart Association Guidelines

The American Heart Association (AHA) is closely associated with the development of CPR and cardiac emergency care guidelines that are used by

millions of health care providers around the world. The AHA Scientific Sessions 2005 that informs guideline development was attended 17662 delegates from more than 57 countries (American Heart Association, 2006). These guidelines are based on a systematic, evidence-based review of resuscitation science. The PBECP guidelines and protocols are founded on the latest AHA recommendations yet do not carry the same recognition in the view of Participant 2: “The document will have more credibility if it makes reference to the latest AHA recommendations”. Note that because the derivation is not acknowledged, their credibility is called into question.

The AHA management of specific conditions such as anaphylaxis differs from the PBECP guidelines and protocols: “The [AHA] resuscitation guidelines talk specifically about anaphylaxis to the escalating dosages in prolonged resuscitation, the protocols talk about the normal standard doses” (P3).

The AHA recommendations provide comprehensive information that supports the algorithms as is confirmed in response to a question on whether the AHA Resuscitation Guidelines offer more guidance than the PBECP guidelines and protocols, the response was: “By far” (P17).

Participant 2 also accepts that the AHA guidelines may differ from those recommended by the European Resuscitation Council, which may again differ from the recommendations of the South African Resuscitation Council: “The AHA guidelines were the CPR guidelines have changed... the AHA says [a ratio of] 2:30 [for CPR] now which one is right ...the BMJ [British Medical Journal published European] guidelines says [a ratio of] 2:50...”.

4.3.6. Errors in the PBECP Guidelines and Protocols Reduce their Credibility

Participant 3 mentioned that there were errors in the PBECP guidelines and protocols. The errors impacted on the credibility of the document: “...so many faults that leads them to doubt the document”. “If the document [protocols] is foolproof it will result in more compliance”. However, the general consensus

was that there were few errors and that these did not significantly influence non-compliance. As an example, Participant 7 mentioned that the milligram per kilogram dose and the maximum dose of Atropine would only work for a patient weighing a maximum of 60 kilograms. When questioned which dose would be used Participant 7 responded: "I go for the dose per kg and sometimes go for the maximum depending on the circumstances".

4.3.7. Inappropriate Drug Use or Dosage in Guidelines and Protocols

In response to the question as to which drugs were problematic, participants identified Midazolam, Morphine and Adrenaline as the most controversial. Other drugs mentioned include Aspirin, Furosemide, Sodium Bicarbonate and Diazepam.

The drug dosages stipulated in the PBECP guidelines and protocols are consistently raised as an area of concern by the participants. The dosages are regarded as too small to be efficacious or inadequate to cater for the clinical picture of the patient in the emergency setting. The dosages do not accommodate the length of time it takes for the patient to reach hospital. The practitioner can administer the maximum recommended dosage and then find the effects of the drug wearing off and would be forced to administer an additional dosage effectively exceeding the maximum recommended dose.

Participants 6 and 7 identified a conflict with the stipulated maximum dose: "...the protocol dosages, it will say the maximum dose and the recommended dose per kilogram are in conflict" (P7). "...say this is your max dose, then I can go now but when it is per kilogram what do I do now?" (P6).

A less frequently mentioned problem is that the drug may not be the most appropriate one for the situation and patient.

Subcategories of the specific drug protocols which were problematic were identified, and are described hereafter.

4.3.7.1. Midazolam and Diazepam Used in Sedation

The following comment supports the predicament created by the PBECP guidelines and protocols: "...the sedatives in the rural areas, the transfers and the limited dosages are not adequate so you have to step outside your protocol to get your patient to the other side". "I think the new protocols need to look at the max dosages and the transfer distances or get stronger sedatives" (P8).

This limitation in the protocol was identified by several participants, including P13, P18, P12, P15, P3, P8 and P9 who essentially relayed the same message that the limitations on the drug dosages did not accommodate the sustained care of the patient (Appendix 4:54).

The following extract illustrates the appropriate use of a drug but also how uncomfortable the practitioner is when being forced to exceed the maximum recommended dose: "The dose issue, if you are 160km to hospital, if you have convulsions you stopped it with 10mg of Valium[®] but after 20 minutes you again have convulsions again and repeat the dose". "You've now administered the maximum dose, but the patient has again a fit, you too have exceeded the protocol" (P15), (Appendix 4:33). When asked about their feelings when exceeding the dose, the response was: "What now must a do, but as I add another 5mg then the patient stops fitting".

It may also be that the drug is being used incorrectly. Midazolam is used to sedate patients for intubation at a recommended dose of 0.1 to 0.3mg/kg. However, in one study it was only used as the sole induction agent in 16% of cases (Sagarin, et al. 2003: 329). In effect, Midazolam as it is used in the pre-hospital setting in South Africa may not be the drug of choice and may need to be used in conjunction with other sedative agents to provide prolonged sedation required for long distance transfers.

The maximum dosage for Midazolam in the guideline and protocol is 0.3mg/kg. This would translate to 24mg of Midazolam for an 80kg patient. Participant 12

recorded exceeding the recommended maximum dose: “Dormicum® [dose of] 15mg to sedate a patient for intubation just doesn’t work, you have to give much more than that”. When questioned how much more, the response was: “You got to give up to 30mg because most of the patients that we do actually sedate are alcoholics or being exposed to drugs and sometimes you can give up to 45 mg and it doesn’t work...”. Large dosages of Midazolam are being administered by paramedics to obtain the desired level of sedation for oral intubation. The habitual use of alcohol and/or other narcotic drugs will influence the half-life of drugs administered to patients (Hassan, 2006). The guidelines and protocols do address the concern raised by Participant 12 by stating that doses must be calculated according to each patient’s individual requirements and that drug doses must be titrated against effect (Health Professions Council of South Africa, 2003). In instances where the maximum dose is reached without the desired effect, the practitioner is required to obtain permission from a medical practitioner before administering a higher dose.

In an interview, the medical practitioner responsible for a hospital emergency unit acknowledged that patients arriving at the unit had on occasion received higher dosages on Midazolam. The net effect of this higher dose was a longer period of stay on a ventilator. The medical practitioner recommended that the Board consider alternative sedative drugs for pre-hospital use.

4.3.7.2. Morphine Protocol

The time spent on the scene of an emergency should ideally be kept to a minimum to ensure that the patient reaches definitive care in hospital expeditiously. The ‘Golden Hour’ concept is commonly understood as starting at the time the incident occurred to when the patient reaches definitive in-hospital care (Mattox, 1997). Paramedics continue to use this concept as a reference even though population-based studies from several centres have demonstrated that it is not a fact but a concept. As time becomes a critical factor, the practitioner may not allow sufficient time to elapse for the maximal effect of the drug to take effect before administering a higher dose.

The peak onset of action of morphine may be too long for its effective use in the pre-hospital environment: "...the resuscitation guidelines says that morphine takes 15-20 minutes to reach peak onset, we want to give it before we splint a fracture femur or to extricate" (P19). This concern is shared by P13: "...it doesn't help the situation if the patient is entrapped and it's taking 15 minutes for the drug to work". (Appendix 4:57)

The delayed effect of the drug may result in a number of problems: initial overdosing in an attempt to achieve the dose against effect result; omitting to administer any analgesia; carrying out the procedure aware that the patient may not have the full effect of the drug or using an alternative analgesic agent such as nitrous oxide.

4.3.7.3. Adrenaline Protocol

Adrenaline use in cardiac arrest is universally accepted due to its potent alpha effects, although when investigated in clinical trials its use does not appear to be beneficial in significantly improving survival to hospital discharge (American Heart Association, 2005). In addition, non-compliance with recommended dosages appears to be a common problem. A study was conducted in Sweden to determine whether adrenaline was administered in accordance with advanced cardiac life support guidelines during cardiopulmonary resuscitation. It found that in 68% of cases, the average time between dose intervals was longer than the recommended 3-5 minutes and the adherence to the recommended guideline was lower in out-of-hospital cardiac arrest (Johansson, et al. 2004). The reasons for non-compliance with the advanced life support guidelines were not established in this study.

Similarly, several participants indicated that they were non-compliant with the recommended adrenaline administration dosage. In spite of several studies that show that initial or escalating high-dose adrenaline has only occasionally improved initial return of spontaneous circulation and therefore did not impact on early survival rates. In eight randomized clinical studies involving more than 9000 cardiac arrest patients, high-dose adrenaline produced no improvement in

survival to hospital discharge rates or neurological outcomes when compared with standard doses. The American Heart Association recommends a standard dose of 1mg of adrenaline every 3 to 5 minutes during adult cardiac arrest (American Heart Association, 2005).

The participants base their practice on their own experience and outdated knowledge: "I don't have those successes with normal 1mg" (P18). When questioned as to whether the practitioner was comfortable with that practice, the response was: "Yes, my success rate is higher with mega-dose". In response to the question: "Is mega-dose still your current practice"? The participant said: "Yes, that's the way I was taught". (See Appendix 4:12)

This practice was common to Participants 12 and 18, both of whom hold the CCA qualification: "...giving 1mg adrenaline as a starting dose for CPR, I've tried the 1mg route and by word of mouth you listen to the older paramedics who have been in the game for a long while they say start with a mega-dose". "I found that the mega-dose works much more effectively" (P12). "Yes, I've had a few people walking around that have been successfully resuscitated with mega-dose" (P18).

The teaching and more especially the status or reputation of the teacher reinforces the practice. Participant 18 continues to use larger doses because of the teaching of two influential medical practitioners: "I was taught mega-dose by [Dr] K and [Dr] D and we got a few people back [successfully resuscitated]" (P18). Interestingly one of the medical practitioners mentioned, today teaches and practices the new recommendations. However, Participant 18 is still influenced by what was taught many years ago.

Participant 16 alluded to using alternative doses when the recommended dose failed: "I don't know what the issue is with the mega-dose at the moment. My personal opinion is once the guideline hasn't worked that you need to try something else..." (P16).

Participant 13 concluded that there is no significant difference in the outcome between standard one milligram and five milligram dose regimes: "...final

outcome of the patient; to me there is no difference whether you use a mega-dose or whether you use your 1mg every 3 minutes” (P13). Without any significant changes to the outcome, practitioners are more likely to continue with their traditional practice despite scientific evidence to the contrary. The period of time that the practitioner is engaged with the patient is relatively short in the pre-hospital phase. The scientific evidence is based on the entire spectrum of care that includes pre-hospital, in-hospital and survival rates after hospital discharge.

The non-compliance with regards to adrenaline doses is not universal as suggested by Participants 7 and 17: “On the contrary I’ve had success with the standard 1mg dosages.” “I gave a lot of adrenaline in total but it was in 1mg dosages” (P7). “Likewise” (P17).

Despite evidence to the contrary it would appear that high dose adrenaline administration is common practice in cardiac arrest. In a 1995 trial in Australia, researchers found that higher Adrenaline use in resuscitation showed significant ($P= 0.01$) change to beneficial ECG rhythm when 10mg of adrenaline was used compared to a 1mg dose. However this change did not reflect in improvement in survival to hospital discharge (Woodhouse, et al. 1995:249). The ALS practitioner using higher dosages may successfully resuscitate the patient to the point of the hospital casualty unit but may not be aware that the patient does not survive to be discharged from hospital.

4.3.7.4. Specific Problems with Drugs in Other Protocols

Practitioners specifically identified problems with other PBECP guidelines and protocols associated with the use of Adrenaline, Midazolam, Morphine, Aspirin, Furosemide and Diazepam.

Participant 19 found that the PBECP guidelines and protocols stated that Aspirin administration was contraindicated in patients with asthma but its use in patients with asthma is listed as a precaution in the SAMF. The experience of this participant is that often myocardial infarction patients, who may benefit from

Aspirin, have a history of asthma and that the benefits of Aspirin administration would outweigh the potential risk of an asthma episode. (Appendix 4:6)

The dose of Diazepam was identified by Participant 15 as insufficient to successfully terminate epileptic seizures: "... if you have convulsions again and you repeat the dose... you now administered the maximum dose, but the patient has a fit again...". (Appendix 4:33)

Participants 3 and 22 advocate the use of escalating Adrenaline doses in anaphylaxis as they found is recommended by the AHA Resuscitation Guidelines. (Appendix 4:12)

In the experience of Participant 21 the dosage of Furosemide in the PBECP guidelines and protocols was inadequate because many of the patients that required Furosemide are using the tablet form of the drug. "... Lasix[®] there is a max dose, how many times you call the medic and they will give him double that because they would already be on Lasix[®]". (Appendix 4:38)

4.3.8. Conclusion

Figure 4 shows the major category and its categories and subcategories.

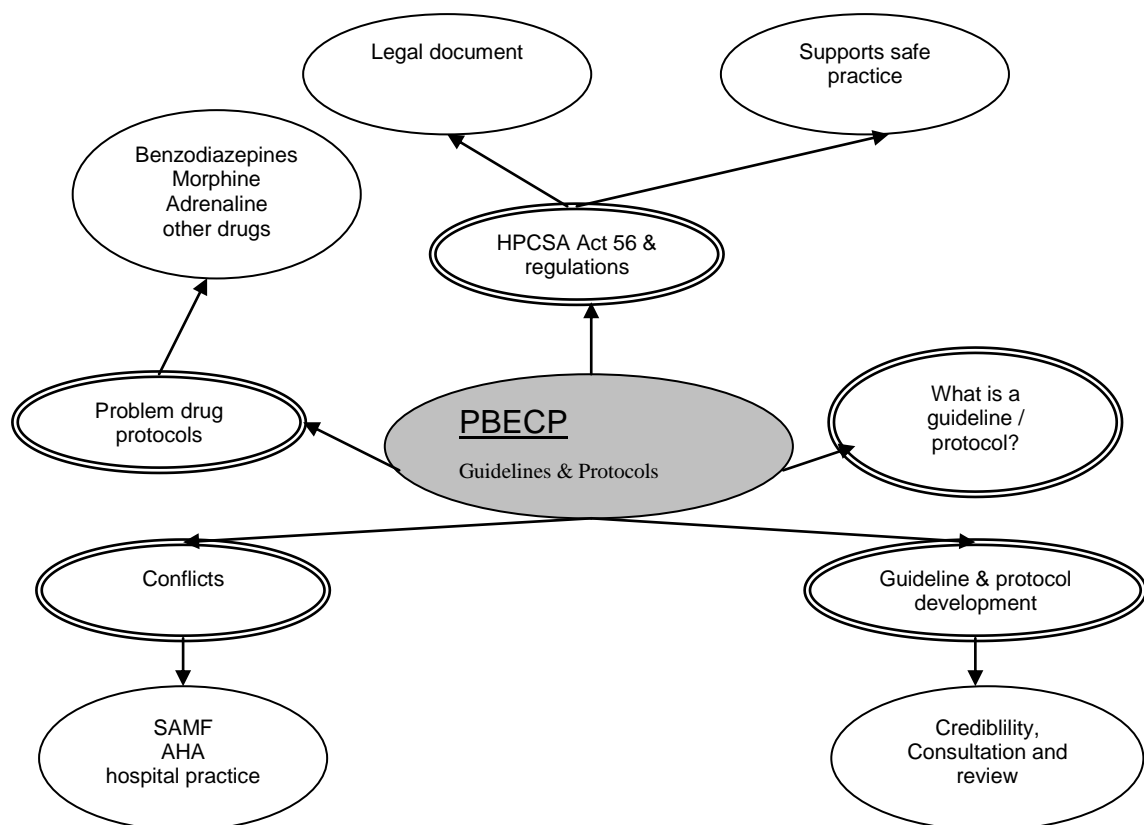


Figure 4. The factors influencing PBECP guideline and protocol usage.

The credibility of the PBECP guidelines and protocols is questioned by practitioners who participated in the study: "...why would we want compliance to something that we have established is flawed?" (P19) There is obvious confusion as to what a guideline and protocol is. The process of developing guidelines and protocols comes under scrutiny as does the differences that exist with other guidelines.

The key issues that emerge in relation to the role of the PBECP are the lack of clear definitions with regards to what a guideline is and what a protocol is. Practitioners have conflicting views and interpretations of how they are permitted to use the guidelines and protocols. Specific examples are given of how the PBECP guidelines and protocols are not congruent with other

guidelines, such as the SAMF, that are commonly used by other health professionals.

The participants were able to identify several protocols that they had encountered problems with. These specifically related to the drug dosages, indications and contraindications for use.

4.4. Education and Training

Compliance or non-compliance with the PBECP guidelines and protocols by ALS practitioners, in relation to education and training is informed by factors such as: differences in education and training; use of outdated teaching methods; lack of participation in continuing professional development and insufficient pharmacology knowledge.

It would be reasonable to conclude that education cannot take place without training, and vice-versa however for the purpose of this chapter, education is viewed as the acquisition of knowledge, skills and behaviour in a manner that encourages problem solving and inculcates ways of thinking that are productive, effective and rewarding thus preparing the learner to deal with an solve a broad range of problems, and to choose which problems are important and which are not (Moore, 1998). Training, according to Moore, facilitates the effective use of certain techniques, places emphasis on rote learning, minimises analysis of their theoretical presuppositions and reducing teaching to the application of the formulas without consideration to their learning process.

4.4.1. Type of Qualification of the Practitioner

The type of qualification appears to be a factor in non-compliance. To register as an ALS practitioner with the PBECP one would need to have successfully completed either the three year National Diploma in Emergency Medical Care or the nine month duration Critical Care Assistant (CCA) course. Entry to the CCA course is permitted after successful completion of the Basic Ambulance Assistant (BAA) and Ambulance Emergency Assistant (AEA) short course and

at least one year's clinical experience in an ambulance service. The curriculum of the BAA, AEA and CCA courses is based on technical skills as compared to the curriculum of the National Diploma: Emergency Medical Care (EMC). The short course curriculum does not place emphasis on evidence based practice and clinical decision making. The following statement: "According to our training, or ability and what we see and have to do out there, the protocol is not sufficient" (P18). This illustrates the dependence by CCA qualified practitioner on the PBECP guidelines and protocols because of their perceived inability to be able to make independent clinical decisions.

During the focus group discussions it became apparent that participants distinguished between the CCA qualified practitioners and the practitioners holding a National Diploma: EMC qualification. Participants also distinguished between ALS practitioner's who qualified pre and post 2000 as is evident in this extract: "...you will have old school CCA's and new school and you have National Diploma qualified paramedics [all trained differently]" (P18).

The short course mode of ALS practitioner training that exists today is not unique to EMS in South Africa. Paramedics in the United States of America (USA) and the United Kingdom (UK) are also trained in this manner however there is a growing trend in the USA and UK towards formal education. Fourteen Colleges and Universities in the USA offer a Bachelors Degree in EMS. In 2000, the Joint Royal Colleges Ambulance Liaison Committee published a discussion document on the concept of the practitioner in emergency care. This paper suggested that the non-degree paramedic training programmes have left paramedics lacking in key attributes such as clinical judgement and limited in other areas, such as patient assessment (Kilner, 2003:378).

At a meeting with training stakeholders in September 2006 the PBECP, together with the National Department of Health, announced that the future professional qualification structure would comprise of a two-year National Diploma and a four-year Professional Degree. It is envisaged that the current short course system of education will cease in 2010 and that by 2015, 80% of the workforce in the public sector would hold professional qualifications. The

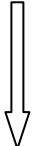
move to formal education as opposed to the informal, short-course training route is supported by Participants 13 and 2: “I personally think that all the short courses should be done away with”. “I’m a firm believer in the Diploma course... [it] has been out of reach for some of us...” (P13). “I don’t think that the [education and training] system is good enough to continually educate the advanced life support practitioners out there” (P2). None of the participants objected to this suggestion. The National Department of Health, Human Resources Directorate concurs and suggests that the emergency care practitioner make-up must include aspects such as personal wellness, communication, basic science, life orientation and applied technology (Department of Health, 2006).

4.4.2. Emergency Care Training

The traditional method of instruction encouraged a cycle of experience and practice after the initial training. With little or no continuing medical education, reflection, consultation and critical thinking the practitioner is unlikely to use experience wisely or adapt to change in practice. As is illustrated in Table 2, skills focused training is a quick fix solution to correct a problem with low personal involvement on the part of the learner. To achieve transformational change requires a sustained period of educational development of the learner with a high level of consciousness and personal leadership.

Table 2 and Figure 5 illustrate the pitfalls of EMS short course training in South Africa. This type of training may have been an acceptable solution to meet the needs of EMS at the time the EMS started but as emergency care began to evolve and mature, deficiencies in this educational approach become apparent as practitioners are slow to adapt to challenges of new knowledge and the resultant changes to protocols and guidelines.

Table 2. Personal leadership and organizational change in relation to method of training and education (adapted from Wills, 2006:10).

Type	Primary Focus	focus	strategy	level of consciousness	PERSONAL leadership	development	Higher Education
Reactive change	Fix the problem	Outside-In, Local	Quick fix Structure	How	Low	Trained to perform tasks	
Operational Change	Continuous improvement	Outside – In, Area	d training, skill development	What, How	Low	Trained to meet new requirements	
Transitional Change	Short to medium term survival	Outside-In, System Wide	Redesign strategy, systems and processes	What, How, Why	Low/High	Build Capacity for change	
Transformational Change	Long term sustainability	Inside-Out	Emergent process, changing culture and mindset	What, How, Why, Caring Why, Caring For	High	Prepare mind for transformation. Capacity for continuous learning, Learner centred	

What is evident from the statement by Participant 18 is that experience is occurring without critical reflection: “It is also what you feel comfortable with, your previous experience, I’ve been a paramedic now for 12 years and you always go back to what you feel comfortable with, I’ve seen the results, I’ve seen patients recover and you always tend to go back to your previous experiences”. “The protocol will say this, but you have a gut feeling that this is not what is needed”. Illustrated in Figure 5 is how practitioners, when given the

right tools, during their training and education, can use their experience to improve their practice by review and reflection.

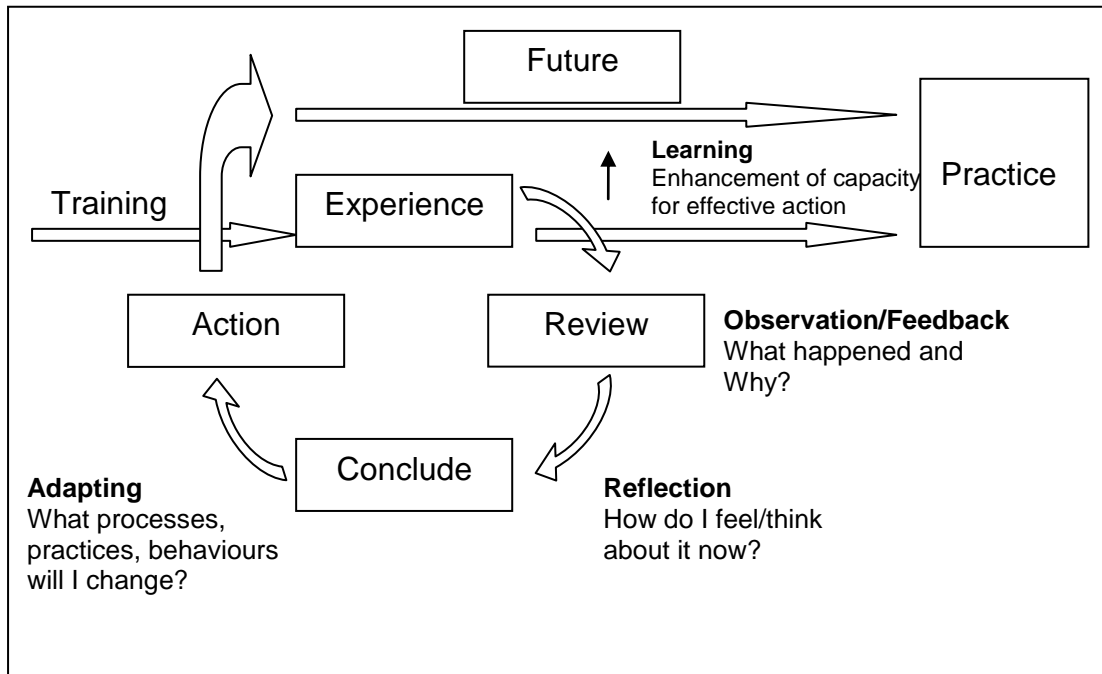


Figure 5. Learning cycle showing the growth after review and reflection (adapted from Wills, 2006:13).

The absence of ongoing review of clinical practice by the practitioner further encourages poor practices. Reflection enables practitioners to look at their actions, thoughts and feelings and is considered to be a means of learning from practice which is a cornerstone for professional development and growth. If the practitioner fails to challenge their own practice there is a risk that it will become habitual and routine (Moloney and Hahessy, 2006:50).

To prepare practitioners who are able to think critically and solve problems in a variety of clinical practice settings, requires teaching strategies that promote meaningful learning, instead of using traditional methods that depend on memorisation as the learning method (Moore,1998). The frequent use of adjectives, such as “drum”, “hammer” and “indoctrinate” confirms the use of outdated teaching practices in earlier paramedic training. Practitioners were expected to memorise the PBECP guidelines and protocols and respond verbatim in order to pass the final examination. The method of teaching, led to

the 'indoctrination' of the learner and when changes were later made to the PBECP guidelines and protocols it was inevitable that practitioners were then unable to modify their practice to accommodate these changes. Participants 12, 18, 5 and 16 identify with this methodology: "...it's just that the way you were examined and ... taught, your lectures will drum into you, this is the way it's going to be...". "... the way you are trained that actually makes the big difference". "You have a great deal of experience but your protocol that you learnt in 1986, it is like parrot fashion, it is stuck in you and that is what you are going to do". "You'll change only if you tried it and it works" (P12). "It's also the way that it's forced into your brain, the training, it's going to make you exceed or not exceed your protocol" (P18). "It's a question of me being more comfortable with things that I learnt 10 years ago because they got drilled in" (P5). "We have been taught and have drummed into us remembering dosages as opposed to learning what it actually does" (P16).

Very few of the instructors involved in providing short course education have formal educational qualifications. The outcome of this is evident in the description of the outdated teaching methods employed to ensure the transmission of knowledge. "It all depends on who was your instructor, (did he/she give) ...you the freedom of thinking for yourself or is it someone who said you will do this according to protocol". It depends on your instructor, are you too scared to step outside your protocol or treat clinical signs and symptoms". "I would prefer treating the clinical signs and symptoms of the patient" (P18). Participant 12 recommends a method: "You should have lateral thinking and you should have an open mind".

The introduction of a standard CCA curriculum in 1994 did improve the way in which CCA training was done. However, after undergoing revision in 1998 no further curriculum changes were made by the PBECP. "...you had people [paramedics] here from 1986 ... in those years there was never a curriculum". "These guys were trained based on how a person felt the curriculum should be". [They] "... indoctrinated people into a certain way of thinking". "But since 1994 when they introduced the first curriculum things have changed, the problem however is that Mr A or Mr B has not changed with the system, he has been left

behind”. “...the training that he had...was most probably two or three months...which is insufficient” (P2).

When questioned on the difference in practice between pre and post 2003 qualified paramedics and whether differing practices are still happening, the response was: “Yes, ...mainly with the paramedics that qualified a long time ago, ... that’s never been or had the opportunity or never really cared to go for refresher courses and just jack up their skills and see what the new protocols are about” (P13).

Not all the practitioners who were trained in this era fit this profile. Participant 10 defends this category of practitioner: “...you’ll actually be surprised of how many of the older guys that did the two to three month paramedic courses are current...”.

Participant 19 reflects on the current educational approach that is used at the Universities of Technology: “...the institution where I trained ...we weren’t ever given protocol tests... instead we were given big essay topics; like discuss high dose adrenaline versus standard dose adrenaline and make use of so many references within a time period”. This educational approach is in keeping with the outcomes based education approach, adopts a learner-centred approach. Learners are expected to construct their own knowledge, skills and values; the lecturer is the facilitator to the learner’s self driven search (Parker, 2002). The lecturer creates an environment for learners to build their knowledge.

The PBECP guidelines and protocols are at the very foundation of the CCA course. The entire course is focused on the student mastering and applying these standards in simulated patient scenarios. In the statement: “The teaching emphasizes the book as the gospel while the book is not the gospel” (P2), one becomes aware of the PBECP guidelines and protocols are being associated with the Bible, that is it contains prescriptive ‘commandments’.

Conflict arises when actual practice is not always supported by the PBECP guidelines and protocols. The narrow method of teaching that limited

interpretation and understanding of the PBECP guidelines and protocols encourages non-compliance when the 'one size fits all approach' fails to work in practice. "If we accept that the protocol is ...justifies being called a Bible then compliance is a given and there is no negotiation about it, but when there is still some debate and some of the issue are not clarified then the guy's compliance will be lacking, and they would rather use other methods or ideas and maybe not comply with the protocol step by step" (P10). This is supported by Participant 19: "In my view the initial methods or ways we did things in the emerging stages of the profession was a very cowboy, non-thinking, closed approach were the protocol was seen as the Bible, it was a series of events that would take place one after the other".

4.4.4. Regional Variations in Training

The PBECP guidelines and protocols may be interpreted and taught differently at different colleges and regions in South Africa: "...there is too much deviation in training as it is at the moment. Institute X is doing this and institute B is doing that" (P16).

The experience from Participant 3 after meeting paramedics and medical practitioners from other regions during a paramedic competition, is that different provinces have different practices despite what the PBECP guidelines and protocols may say: "...this case that required a cardiac infusion and we put in 1mg but then Dr B from Durban... said but we are using 5mg for an infusion and Wits [Technikon Witwatersrand] were using 10mg". "But I said the protocol says 1mg and they had a problem with me using the 1mg...". "So your own experience is that the protocol is implemented differently in different parts of the country".

Training institutions may interpret and introduce changes to the PBECP guidelines and protocols either to suit local practice guidelines which may vary from the PBECP recommendations. As an example there would be less emphasis during ALS training on drugs such as Amiodarone because these drugs are not issued by EMS to ALS practitioners in the region: "The different

places of training also impacts on how people see the protocol". "Every college has its own way of training" (P18).

4.4.5. Insufficient Pharmacology Knowledge

Pharmacology is taught as an annual subject in the third year of the National Diploma programme. The pharmacology curriculum equips the student with broad knowledge and it is not limited to the drugs listed in the PBECP guidelines and protocols. The drug information taught on the CCA course, on the other hand, is limited to the drugs in the current PBECP guidelines and protocols and provides limited information on general pharmacology. This is supported by Participant 9: "...this is how I was trained, you know about the drug, you know your protocol and you get to know additional information about the drug... [Earlier qualified paramedics] will say no... that not what the protocol says".

CCA qualified participants identified the gap in knowledge as an obstacle that hindered their understanding of the drugs listed in the PBECP guidelines and protocols and therefore influenced the degree of compliance as is evidenced in the following extracts: "I believe the core understanding of the pharmacology is not there [in the protocol book]" (P22). "With the new National Diploma: Emergency Care, National Certificate programme surely the guys [practitioners with these qualifications] do more pharmacology" (P18).

Participant 21 would prefer that the education and training of paramedics be of such a nature that it would provide the ALS practitioner with sufficient knowledge to allow for the unrestricted and judicious use of drugs: "...if you qualify as a doctor you get to use the drug as you see fit". "Yes, give a protocol with certain medications but then you are allowed to use that medications as you see fit, use the medications to its full extent, like a doctor". "Adapt the training in such a way that we are allowed a drug". "We must be taught and use it to the full extent". "They should state that yes, you are allowed these drugs but you are allowed their full extent". "You still must be limited, but you are not limited to small petty things that the book says 40mg [laughter]". This statement

reflects the infancy of the profession as it evolves towards autonomous practice, which is discussed later in this chapter.

The statement by Participant 3 that medical practitioners do not follow guidelines and protocols is incorrect: “Doctors don’t have a protocol book what makes us different”. Practice guidelines exist for most health care professionals (Schwartz, et al. 1999:1152).

The statement by Participant 10 illustrates how his teaching and experience differs with regards to the pharmacokinetics of the drug Midazolam and how this impacts on clinical practice. “There is maybe one occurrence of a side effect and that is in the protocol but somebody that works with it on a daily basis may contradict what is being said”. “I am talking about Dormicum® and inducing hypotension”. The isolated experience of the practitioner may override the evidence presented during the training.

A side effect is an unwanted effect that occurs in the course of the normal action of a drug, for example Morphine produces constipation. A drug would typically undergo extensive clinical trials before it is used on humans. The incidence and severity of side effects differs from patient to patient. A practitioner may not see side effects in a hundred patients but then have one patient that has severe side effects to a drug. Some of the side effects are overt and may not readily present during the brief and acute phase of treatment, for example, hypotension (Hassan, 2006). This may be due to the practitioners’ expectation that patients with severe injuries deteriorate and not attribute the changes to the side effects of drugs that have been administered. As an example, hypotension due to blood loss is a common sign in patients with trauma. However several drugs, including Morphine, Midazolam, Adenosine, Glycerol Trinitrate, Lignocaine and Furosemide also can produce severe hypotension (Health Professions Council of South Africa, 2003). The ALS practitioner may be mistaken and attribute the hypotension just to the blood loss.

4.4.6. Lack of Participation in Continuing Professional Development

The need to introduce continuing professional development (CPD) was raised by fourteen of the participants during the focus group discussions. None of the participants had reservations on CPD: "...bring that one rule that every paramedic that has been trained must be updated" (P14).

There is no current requirement for emergency care practitioners to participate in continuing education or recertification. This will change in 2007 when continuing professional development will be compulsory for every practitioner registered with the Health Professions Council of South Africa (E.C. News, 2006:6). Points towards professional development can be accumulated in any one of three ways; the first being non-measurable outcomes like conferences, the second being measurable outcomes in the form of interactive skills workshops, and the third centres on activities associated with structured learning. Practitioners that do not comply could face penalties in the form of practicing under supervision, be required to undergo a remedial programme of continuing education, an examination, suspension from practice or being struck from the roll of practitioners.

CPD is recognised as a part of professional responsibility and accountability, and is fundamental to professional and therefore organizational success. CPD can be described as a planned process that enhances professional performance. A practitioner, by improving practice through activities such as reflection, evaluation and consideration of evidence, will ultimately provide good quality patient care (O' Sullivan, 2004: 174).

Participants 8, 12 and 11 were concerned that practitioners had been practicing for years without having undergone any updates: "They did the course in 1989 or 1990 and we are currently in 2006, it's been forever and they never went back [for update or training]..." (P8). "...on the road you actually stagnant, there is no refresher courses, paramedics that qualified in 1986/7 ... haven't been back to the college" (P12). "...they not used to change so they just stick to their protocol because its been working for them for 20 years, 10 years, that's why

they stick with it instead of using the 2003 guidelines” (P11). “The protocols change but who changes the mindsets of the dinosaur” (P8).

Participant 18 suggested an annual re-examination. When asked if an update and re-examination would be likely to change practice, the response was: “Yes, I think it will”. “You will be more up to date as to what is happening”. “If you do an exam every year it will help you to keep up to date with the changes and the new protocols”.

The voluntary participation in CPD is regarded as ineffective by Participant 2: “I don’t think that the system is good enough to continually educate the advanced life support practitioners out there”. The proposed CPD system is based on trust and relies on the individual practitioner to keep documented proof of their CPD activities (E.C. News, 2006:6).

The dependency on guidelines and protocols and less use of sound clinical judgement can be to the detriment of the patient. The absence of opportunities for practitioners to regularly review of their knowledge and update their clinical skills and decision making abilities may negatively impact on their practice: “Unless we have CME programmes in place we run the risk of very sound knowledge withering away and all that is left is that [protocol] book, and that is why [I] place value on that book” (P22). (CME is the acronym for continuing medical education.)

There is an acknowledgement by the participants that there will be attrition of knowledge over time, however there is a lack of personal accountability to ensure that knowledge and skills are maintained at an acceptable level: “(It) ...goes about your training”. “Unfortunately this is where we lack a lot”. “All over the world, every year you are expected to rewrite an exam in order to practice”. “In South Africa, not”. “I’ve lost a whole lot knowledge since I did exams 1994” (P18).

Clinical meetings and updates be used to clarify the PBECP guidelines and protocols and improve compliance: “There was a clinical meeting at which an

anaesthetist came and gave us a talk on Dormicum[®] and he said that in order for it to work we should use it with morphine and we've been using Dormicum[®] and Morphine on patients where we have difficult intubation and it works quite well" (P12).

The extent of non-compliance may be minimised by CPD as Participant 18 describes in response to the question on whether training will change practice. The answer was: "Yes, it will change my practice". "I will then ask why this has worked for me in the past but the reason why it's changed now is because 'a', 'b', 'c' and 'd' has changed and that also enlightens you and brings you up to date with new investigations and things that have happened in the world".

While ALS practitioners may currently be officially regarded as being 'competent', they may become incompetent due to the failure to keep up with constant changes in the art and science of medicine (Stoy, 1998). Non compliance can be as a result of non-competence for one can argue that a competent independent practitioner would not only be one that is legally qualified to performs acts within a specific ranges of skill, knowledge and ability but would assume responsibility ones own skills, knowledge and ability. The practitioner's non-competence may result in non-compliance with relation to the lack of in-depth general pharmacology knowledge, the ability to self-develop oneself, to recognise the benefit of peer review and consultation and to adopt universal accepted best practice recommendations that would improve compliance.

Continuing education must be designed to keep up with the rapid changes in medicine and to fill voids that are identified by quality improvement programmes. Technical and professional practitioners are at significant risk of becoming outdated in their skills and their knowledge. It is not enough for them to maintain the competence acquired in the years of formal education. In the emergency care profession, information is not static; perpetual change is the norm (Stoy, 1998).

4.4.7. Conclusion

Figure 6, depicts the categories, subcategories and their linkages. It illustrates how the dual ALS training and education impacts on ALS practice. The CCA short course training follows an outdated curriculum that is taught by ALS practitioners who do not have formal teaching qualifications and tend to use outdated teaching methods. This system of training does not encourage transformational change and provides inadequate pharmacology content. The regional variations in training and absence of CPD also negatively influence practice.

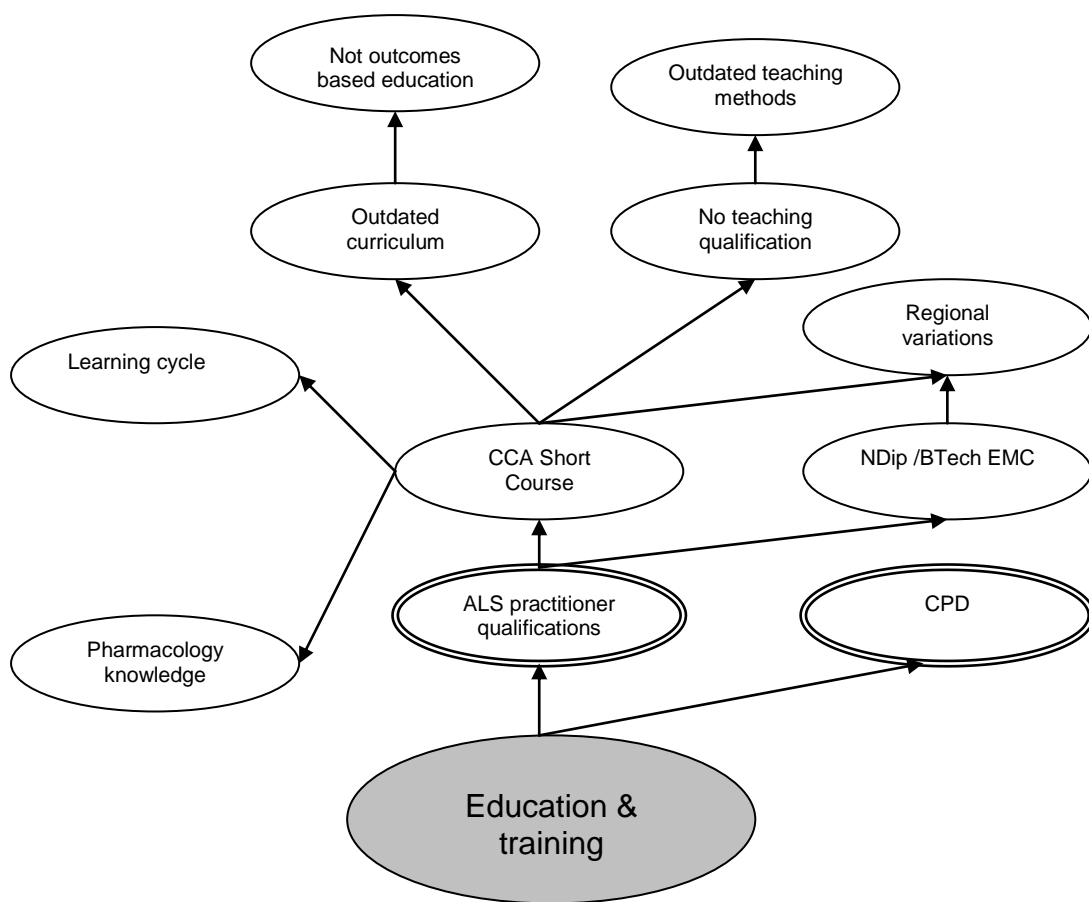


Figure 6. ALS practitioner training and education factors that influence compliance

Significant changes are underway in an attempt to address the quality of education and training of emergency care practitioners. These changes include the phasing out of the short course training system and the introduction of a two-year mid-level worker qualification and a four-year professional degree.

However well these changes may bode for future development of emergency medical services, it does not address the need to update the current practicing practitioners who will continue to be the backbone of emergency medical services for the foreseeable future. It is envisaged the CPD may address this concern.

4.5. The Evolution of ALS Practice as a Profession

The fifth major category that emerged from the data analysis was the evolution of ALS practice as a profession. Non-compliance was clearly related to this process.

“There was an article in the newspaper about a paramedic doing some wonderful work. Her dream was to become a Doctor, but she was dyslexic so she decided to be a paramedic [*laughs*]” (P1).

The term professional is ambiguous and what constitutes a profession has been a source of debate in the last century. Medicine has been described as a prototypical example of a profession and the medical practitioner has traditionally been seen as the pre-eminent authority over all health matters. Freidson (as cited by Margolis, 2005) concluded that autonomy, self regulation and self determination are central characteristics of a professional. Other characteristics include that the work of a professional must be of such a nature as to be of significant public interest; the professional must undergo a prolonged period of training in abstract and complex knowledge, the profession must help create knowledge; and a service orientation must exist (Margolis, 2005:41).

4.5.1. Characteristics of a Profession

ALS practice has yet to be given full recognition in terms of the status of the profession. In many quarters the ALS practitioner is still seen as an ambulance driver: “The doctors and nurses think we are ambulance drivers...” (P13). More

than 80% of the current workforce holds a Basic Life Support qualification which is obtained after four weeks of training. Fewer than 2% are ALS practitioners (E.C. News, 2006:1). The profession is responsible to ensure that it meets the criteria to qualify for professional status.

The ALS profession in South Africa currently finds itself in the process of achieving the status of a profession as shown when the achievements in relation to the characteristics of a profession are considered. The establishment of the PBECP and the status of independent practitioner do afford the practitioner a degree of autonomy and self regulation. The establishment of a professional association would allow a degree of self determination. The termination of short course training will over time address the education and training shortcomings and with the growth of post-graduate qualifications and research, profession specific knowledge will be created.

The key responsibilities of an ALS practitioner would include treating patients in accordance with the PBECP guidelines and protocols, to maintain best clinical practices in accordance with quality standards and to respond to opportunities that enhance professional development. An ALS practitioner would have associations within the organisation, with management, administration and fellow operational crews. External stakeholders are patients, other health professionals, the public and other emergency service personnel and providers. In meeting these responsibilities there is still no guarantee that the ALS practitioner would be appreciated: "...they [Doctors] start afresh as if the patient was picked up from the road and brought straight in". "All your interventions are taken off and thrown to the side". "That gap has not been bridged enough for us to get a foot in the door in terms of getting the profession recognised" (P1). There is progress towards the achievement of specific characteristics of a profession from the following categories.

4.5.2. Independent ALS Practice

The HPCSA defines independent practice as a practice where a registered health profession is conducted by a health practitioner without supervision of

another health practitioner (Health Professions Council of South Africa, 2004). In 2001, the Professional Board and the HPCSA declared all ALS practitioners registered on the Paramedic register as independent practitioners (Justus, 2005). Prior to this resolution, emergency care practitioners fell into the category of supervised practice. This meant that clinical decisions, such as the declaration of death and the administration of medication above schedule five had to be authorised by a supervising medical practitioner (South African Medical and Dental Council, 1998). The training and education of ALS practitioners prior to 2001 was based on the premise that ALS practitioners were the eyes and hands of the medical practitioner at the scene of an emergency and would therefore not require any clinical decision making knowledge and skills in their education and training.

The change of status to independent practitioner should have been accompanied by updating the knowledge and clinical skills of existing practitioners. Essentially, practitioners found themselves in a void, having to fend for themselves with the PBECP guidelines and protocols as their only tool: "...the new one [protocol] brings us a lot of friction in our situation...". "...in the previous one it was stated that you had to make contact with a medical officer" (P20).

Practitioners encounter other health care professionals that are not aware of the ALS practitioner's scope of practice and would question their use of schedule seven drugs as is illustrated by Participant 15 and 21: "The experience has been of queries from doctors about who gave the morphine and what makes you qualified to do this" (P15). "...the doctors are not aware of the capabilities of what paramedics can and cannot do" (P21).

Many practitioners continue to practice in the previous paradigm: "I don't have to phone the doctor to give morphine but I would rather phone the doctor to give an 'up' dosage ... and safeguard myself..." (P21).

The responsibility for ensuring that practitioners are updated lies with the individual practitioner. The role of the HPCSA would be to provide the

framework for continuing professional development. When asked who is responsible to ensure that practitioners are updated, the responses were: "As independent practitioners it is up to us", "...it's our responsibility, its our patients that we are treating, as a recent graduate this is how I feel at the moment" (P7). "... with doctors it's their individual responsibility to update themselves, why can't we paramedics be the same" (P3). "I feel the independent practitioner should try his best, but also from the HPCSA side" [they should provide enforce CPD] (P17). "I spend thousands every year with my CME [Continuing Medical Education], it's up to the individual..." (P16). These statements reflect a growth towards personal self development that is found in a professional.

Historically the PBECP guidelines and protocols were developed by medical practitioners employed within emergency medical services as supervisors of ALS practitioners. Graduates from the Universities of Technology, having completed the four-year Bachelor of Technology: Emergency Medical Care qualification, are frustrated with the constraints of the PBECP guidelines and protocols which can result in non-compliance because they perceive their own clinical knowledge to exceed the constraints of the PBECP guideline and protocols: "There is a sense that the protocol makes me feel that I am not trusted to make that clinical judgement" (P19).

Practitioners that have undergone tertiary education want to practice independently of the guidelines and protocols: "...give us that trust, that we can use the drug to its full extent as we see fit and as the patient responds, but state it in the protocol so there is no risk of a big stick" (P21).

This view is not universal, the CCA qualified ALS practitioners are cautious: "There could be a danger in that because in the pre-hospital setting where things go wrong you are not in a safe environment". "There are factors where you must be cautious" (P4). "I don't want to say that they must just give us a carte blanche". "For some drugs I want to see where I can exceed... when I can help the patient". "Not when there is a side effect to the drug then you continuously give it like carte blanche" (P15). This difference in opinion may be linked to the lack of self confidence that stems from inadequacies of the short

course training focus on narrow skills content, and begs the question "how independent are the practitioners' with regards to the provision of emergency care?".

4.5.3. Trust of the ALS Practitioner

Limited access to Schedule seven medications, such as morphine, may have to do with a lack of trust by management or fear of management that the drug would be abused by the practitioner: "I think that they don't trust us" (P15). "Services don't want to buy it because of previous bad experience". "They might have someone abusing the drug" (P18). According to Gilson, Palmer and Schneider (2005:1428), relationships of particular importance to health care provision are those that exist between practitioner and the patient, and practitioner and the employer. Trust is linked to personal behaviours; the immediate supervisors' actions may affirm or undermine trust in the employing organization. Trust in the organization is linked to the style of organizational leadership and the nature and practices of human resource management functions. Trust offers an ethical frame for understanding health system organisation and performance.

Related to the issue of trust, is the perception that the paramedic profession attracts people with an extroverted personality. There is little evidence to support a distinct personality type that is reflective of emergency service workers as a whole (Wagner, 2005). However, this perception is alluded to by Participants 21 and 4 "You do get cowboys out there". When asked whether the practitioner's personalities did impact on practice, the response was: "Yes we are 'A' type personalities" (P4). "Over the years the PBECP guideline and protocol has changed but the mentality and the practitioner's attitude has not changed" (P3).

4.5.4. ALS Practitioner Use of Consultation

Consulting with peers and other health professionals is universally regarded as good practice. Participants 16 and 9 were of the opinion that this was not universal practice amongst paramedics: “It is the ego effect that people are afraid to consult first and then secondly afraid to whip out a book” (P16). “People are scared to consult one another” (P9).

Participants 16 and 20 acknowledges the importance of consulting: “It is often that the protocol itself is lacking in certain issues where it guides you to a certain position, where you are then left literally on your own and therefore consultancy plays a huge role to fill those gaps”. “I think that consultancy is the key...” (P16). When asked who one would consult, the response was: “Colleagues, doctors, nurses, whichever other health care professional” (P16). “Sometimes you need to consult in certain cases just as a safety measure” (P20).

In my own experience there is an attitude and image that is fostered within the profession that rewards speed of action, bravado and quick autocratic decision making whilst caring for critically ill patients. Referral to books and consultation are viewed as a sign of weakness. This attitude may inadvertently be encouraged in the education and training of paramedic students. During classroom practical patient care simulations emphasis is placed on memory recall of the PBECP guidelines and protocols and unrealistic time restrictions are enforced.

4.5.5. Conclusion

Medical science is evolving at a phenomenal rate. Annually billions of Rands are spent on research that informs clinical practice (Polit and Hungler, 1999:688-689). Emergency care practitioners are not immune to these influences and Participant 19 identifies this information growth: “...when you treat your patients you have some sort of evidence to support that... information is changing all the time so you have to keep up to date” (P19).

The immaturity of the profession is evidenced by the lack of local conferences and symposiums in emergency medical care. There are no opportunities for the development and sharing of new local knowledge. "... [there is a] lack of formal information sharing structure like symposiums and gatherings of this professional body" (P19). Emergency care training at post-graduate level will not only enhance the standard of pre-hospital care in South Africa but provide a locally based research foundation upon which the profession will stand (MacFarlane, van Loggerenberg and Kloeck, 2005:148).

The challenges that would need to be overcome before the ALS practitioner is regarded as a 'true' professional would include a clear definition of their independent practitioner status; earning the trust of other health professionals; the use of reflection and consultation in their clinical practice, and the production of research and new knowledge by the practitioners that will evolve their practice. Registration with the PBECP ensures autonomy, self regulation and self determination of the ALS practitioner. (Figure 7.)

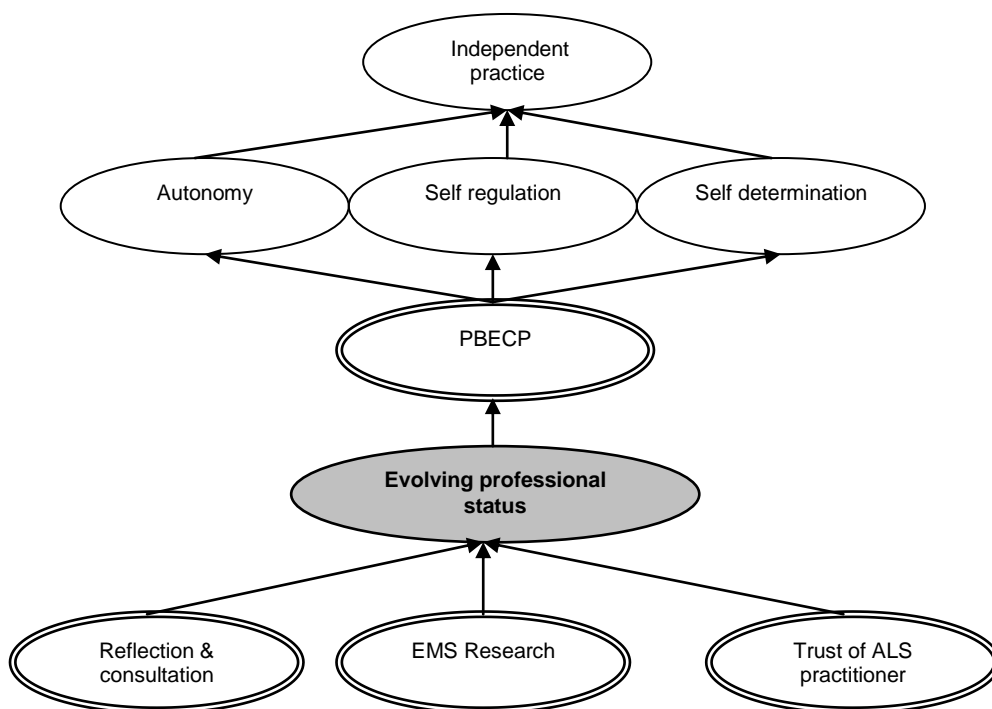


Figure 7. Factors influencing the evolution of ALS practice.

4.6. Summary

The health system focus on delivering health care to the community as part of the Primary Health Care focus has created new challenges for the ALS practitioner. The PBECP guidelines and protocols do not accommodate the unique circumstances of rural ALS practice and this disjuncture between the guidelines and protocols and the realities of rural health care contribute to the eventual non-compliance.

EMS as an organisation has responsibilities include creating an enabling environment for the ALS practitioner. The inability of EMS to provide clinical support consistent with the prescripts of the PBECP guidelines and protocols is cited as a concern. ALS practitioners are issued with a limited range of drugs by EMS employers and inadequate clinical support is provided by EMS to rural ALS practitioners. These factors contribute to the ALS practitioner's non-compliance.

The PBECP guidelines are not clear as to the definitions of guidelines and protocols and what these definitions mean for ALS practice. The process followed to develop and implement the guidelines and protocols has been flawed. There is a lack of consultation and the guidelines and protocols conflict with other universally accepted guidelines. These factors, together with the delayed implementation of CPD, contribute to the non-compliance of the ALS practitioner with the PBECP guidelines and protocols.

The ALS training achieved by means of the CCA short course is inconsistent with that of the education of the National Diploma: Emergency Medical Care. The CCA course curriculum is outdated, does not include sufficient pharmacology and is presented by unqualified instructors that utilise outdated teaching methods to deliver the content. The current training does not support CPD. The way in which ALS practitioners are taught contributes to non-compliance.

The ALS profession is immature in comparison with other health professionals. To attain professional status, the ALS practitioner must produce local research and include inward reflection and consultancy in clinical practice. In so doing the ALS practitioner may earn the trust of fellow professionals and begin to view themselves as more than just ambulance drivers with drugs. The lack of these professional attributes leads to non-compliance.

Although five major categories have emerged as reasons for non-compliance, they are also interrelated. The roles and responsibilities of Emergency Medical Services as an organisation, emergency care education and training and the PBECP overlap and operate within the context of the South African health system. These form the environment in which the ALS practitioner practices. The investigation into non-compliance with the PBECP guidelines and protocols revealed the interrelatedness between the major categories as is illustrated in Figure 8.

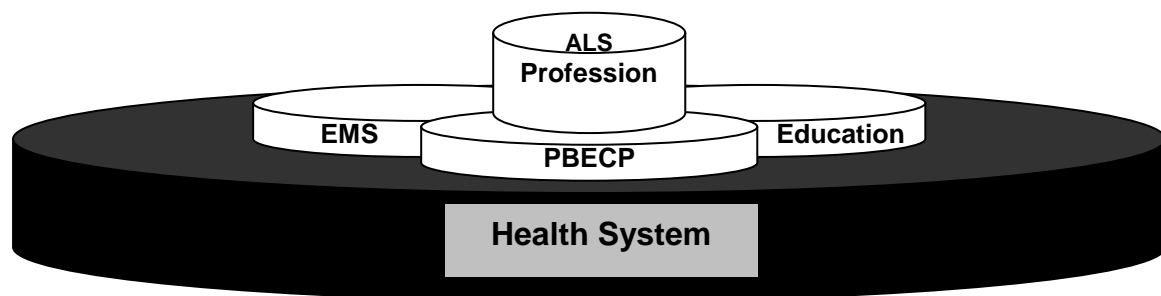


Figure 8. The Context of the Emergency Care Profession

4.6.1. Interrelated Categories

Figure 9 illustrates the interrelatedness that exists as similar categories, such as CPD, link across major categories. The categories that overlap across major categories and the linkages are explained in below.

CPD (See in the Figure 9:a) is a category that emerges in each major category. The lack of access to CPD activities in rural areas, the delayed implementation of a compulsory CPD requirement by the PBECP, the education and training

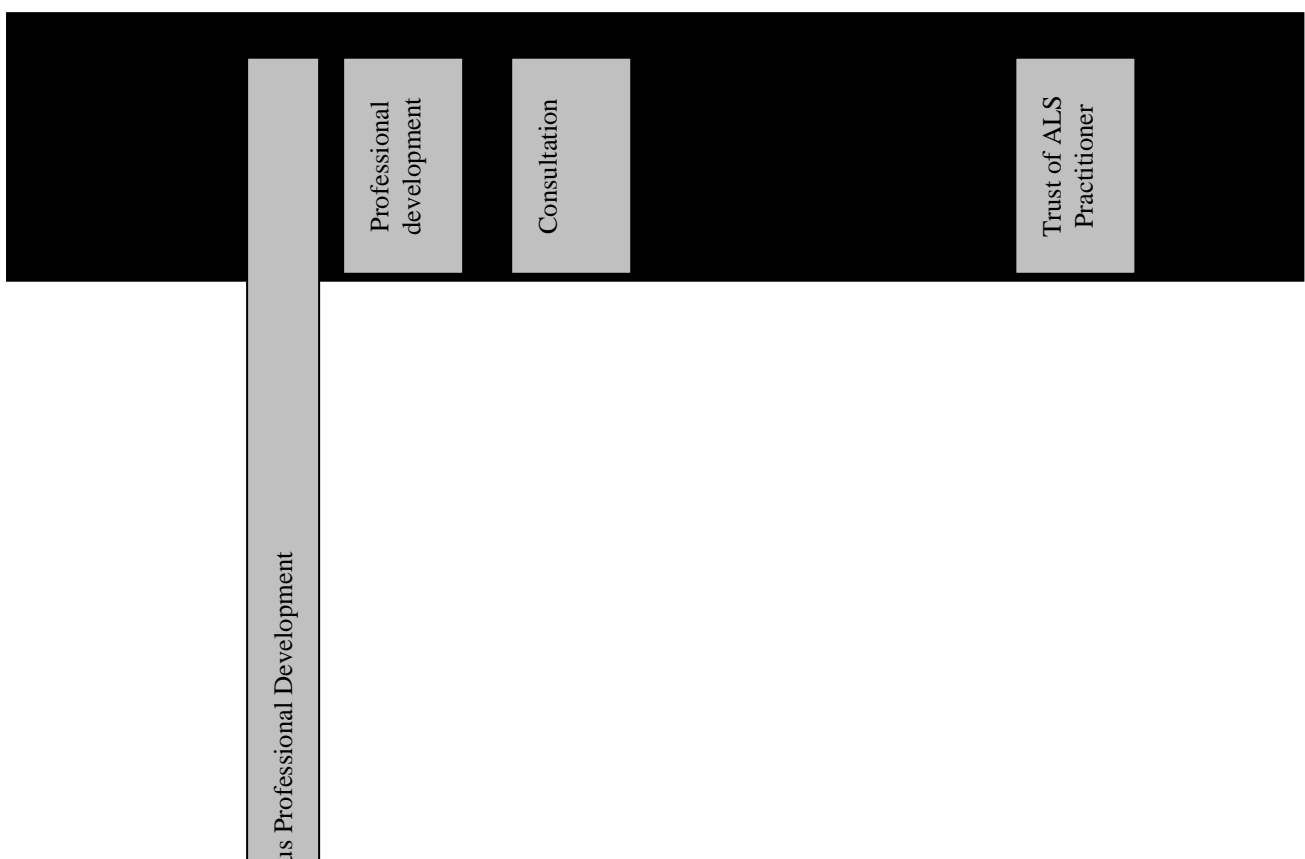
system that does not encourage voluntary participation in CPD and the individual's lack of self motivation to engage voluntarily in CPD, are linked. Essentially, CPD activity is minimal amongst practitioners and this is seen as a reason for non-compliance.

The PBECP has a legislative role as the regulator of emergency care education and training (See in the Figure 9:b). This role includes generating learning outcomes for emergency medical care qualifications. Formal qualifications enhance the professional development of the ALS practitioner.

The development of new guidelines and protocols must be followed by an update on the changes. The teaching method influences the degree of consultation that occurs in practice.

The differences that exist between the hospital guidelines and the PBECP guidelines and protocols (See in the Figure 9: d) causes the hospital staff not to trust what the ALS practitioner has done.

There is a linkage between the health system and EMS. Inadequate clinical and resource support, communications, distance to hospitals (See in the Figure 9: e, f, g) and inadequate medical practitioner support are common to both the health system and EMS.



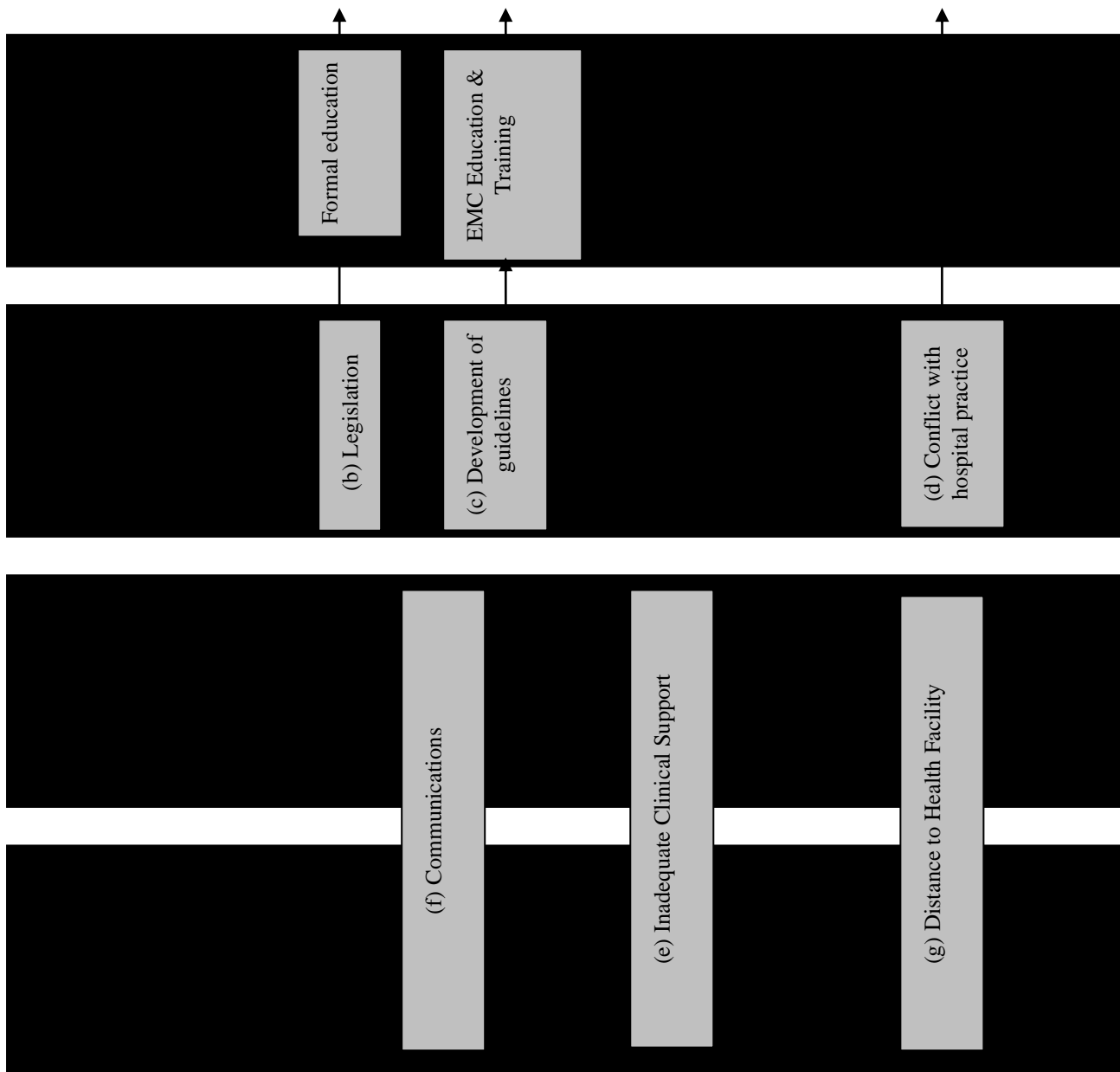


Figure 9. Categories that interrelate across the major categories

Chapter 5

5.0. Findings as to How to Improve Compliance

5.1 Introduction

This chapter represents the major categories and their categories and subcategories which emerged from the data analysis in response to the research question: "How can compliance with the PBECP guidelines and protocols be improved?" They will be explained separately, followed by a discussion of the linkages between them.

As in chapter four, the findings as to how to improve compliance in so far as the views of rural versus urban practitioners, private versus public sector practitioners, the qualifications and experience of practitioners are similar and discussed collectively.

Five categories were identified in seeking solutions as to how compliance by ALS practitioners with the PBECP guidelines and protocols could be achieved. As can be expected, they reflect the categories of the reasons for non-compliance, namely the health system as a whole, the EMS, the PBECP, the ALS education and training system and the ALS practitioner. Essentially, the influences, roles and responsibilities and improvements in the health system, the legislative framework of the HPCSA, the formulation of EMS health policies, and a review of the education and training framework of ALS practitioners will form the basis for improved compliance. However, the evolution of the EMC profession and the professional status of the ALS practitioner will ultimately be required to ensure sustainable compliance.

5.2. Health System Improvements to Increase Compliance

The NCEMS is a committee that has as its members the Directors from the nine Provincial EMS's, representatives from the South African Military Health Services, organised labour, private ambulance association and representation from the PBECP. The committee is chaired by the National Department of Health, Emergency Services Directorate. The committee is mandated to advise the National Minister of Health on matters related to emergency medical

services. Consultation with the National Committee on EMS (NCEMS) is necessary to ensure national health policies and priorities with regard to emergency medical services are embodied in the PBECP guidelines and protocols. NCEMS performs an important role with regards to determining indicators against which EMS service delivery in the nine provinces can be monitored and evaluated. These indicators include nationally agreed to response time targets for urban and rural areas and a 20%:50%:30% ratio of personnel with Basic, Intermediate and Advanced Life Support qualifications employed in EMS. Items under discussion by NCEMS include models of service delivery, medical equipment tenders, preparation for national events such as the 2010 Soccer World Cup, EMS training and the EMS strategic framework. Resolutions taken by NCEMS influence provincial EMS policy and therefore ALS practice (Fuhri, 2006). Quality improvement of emergency care practice is a prominent issue on the NCEMS agenda. The committee is represented in the review of emergency care qualifications and has a representation on the PBECP. Any measure to improve compliance of ALS practitioners with the PBECP guidelines and protocols should be implemented in consultation with NCEMS, as it has a broad EMS representation.

Providing internet access to ambulance stations will allow for practitioners in rural areas to have access to participate in changes to the guidelines and protocols and engage in online CPD programmes. “The HPCSA website should be more interactive...other websites...have continuing medical education facilities” (P2).

Figure 10 below illustrates the mechanism that exists to address health system problems that impact on EMS service provision. Resources shortages in the Department of Health that impact on non-compliance can be raised at NCEMS by the PBECP. Decisions reached at NCEMS are fed back to the Department of Health, and influence EMS policy development and decisions taken by the PBECP.

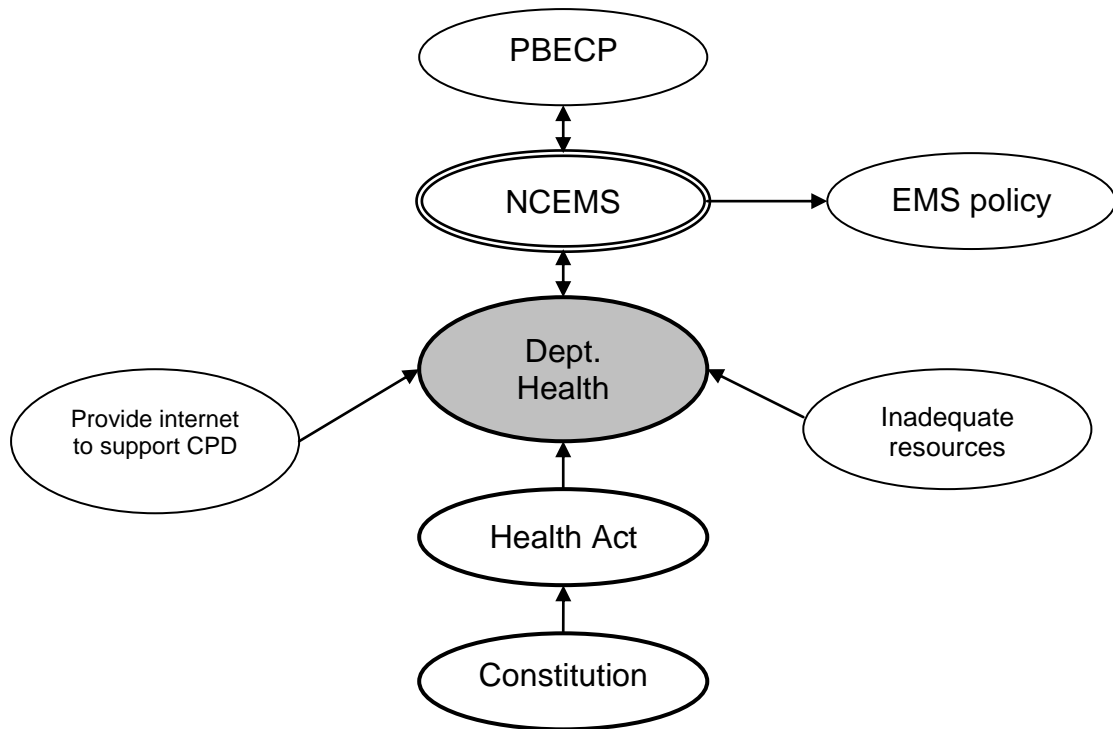


Figure 10. The Health System mechanism to resolve resource provision

5.3. The Role of EMS to Improve Compliance

The EMS organization creates the immediate environment for ALS practice. In this regard, the responsibilities of EMS includes the equitable distribution of resources to rural areas where distances to hospitals are vast and clinics and district hospitals may not be adequately equipped to treat the critically ill or injured. These responsibilities must be fulfilled, in order to provide an environment that will facilitate compliance with the guidelines and protocols. Specific aspects which require attention are identified hereafter.

Firstly, the improvement of the communications network coverage will ensure access that ALS practitioners are able to obtain clinical advice at any stage of their journey to hospital. As a consequence, they will be able to obtain direction from a medical practitioner in instances where they need to deviate from a guideline or protocol.

Secondly, clinical support that is provided must be consistent and aligned with the PBECP guidelines and protocols. Local EMS policies may be required to

ensure that those providing medical direction to ALS practitioners are themselves following accepted practice guidelines.

Expanding the scope of practice for practitioners working in rural EMS systems may need to be considered. However one could argue that rural EMS practitioner's treat fewer patients and therefore there would a deterioration of clinical skills over time. A randomised controlled trail to assess decay in acquired knowledge among paramedics in the USA completing a paediatric resuscitation course found that knowledge decays rapidly with time (Eustacia, et al. 2000:779).

Thirdly, clinical quality assurance programmes should be implemented by EMS in order to introduce effective monitoring and evaluation of the ALS practitioner and check compliance with the PBECP guidelines and protocols. The data gathered from the clinical quality system may be used to identify the CPD topics for the further development of the ALS practitioner. The employer has an obligation to support and encourage employees to engage in life-long learning to improve their education and training. "...the Diploma course that has been out of reach for some of us..." (P16).

In so far as which drugs are issued by EMS, the implementation of the guidelines and protocols is currently at the discretion of the EMS organization as was confirmed by a senior paramedic in an interview: "...people that are working in services that don't have access to the things that they should have access to, so even though they want to comply they can't because they employer doesn't provide with what they require". EMS organizations have a choice to issue and allow the use of drugs, such as Morphine, Adenosine, Flumazenil and Amiodarone, within their services. Cost and clinical control are cited most often as the reasons for non-issue of drugs by EMS organisations. The argument of cost is non-scientific as it can be argued that the unavailability of PBECP approved medications to paramedics may increase morbidity and therefore increase the overall financial burden on the health system. As an example, EMS does not issue ALS practitioners with Adenosine and Amiodarone due to cost. These drugs are indicated for the treatment of the peri-

arrest arrhythmia, paroxysmal supra ventricular tachycardia. The ineffective management of this arrhythmia may lead to increasing myocardial ischemia or cardiac arrest which effectively creates an additional burden on the health system (American Heart Association, 2005). The lack of trust is mentioned in Chapter 4 as another reason why employers do not issue ALS practitioners with drugs such as Morphine. If quality is at the core of any EMS organisation then it will rationally follow that best practice standards should be universally accepted and adopted.

Good radio communications are vital to ensure that the ALS practitioner can access clinical advice at the scene of the incident or en route to hospital. Communication with the supervising medical practitioner is a medico-legal requirement before any treatment that is outside the PBECP guidelines and protocols is undertaken. The establishment of a communications centre in the Overberg area of the Western Cape in 2006 will improve rural access to communications (Uys, 2006).

The distribution of resources to areas of need will reduce the effect of long travel distances to hospital. The establishment of an ambulance station at Leeu-Gamka along the so called "road of death" between Laingsburg and Beaufort West in the Western Cape in 2005 is an example of how resources should be distributed. The town is situated on a national route on which more than a million vehicles travel every year and where there is a high number of serious and fatal vehicle accidents. The location of an ambulance station in this town will reduce the time taken to reach hospital as previously access to health services in emergencies on this specific road and in the surrounding remote rural communities, was a challenge and was dependent on the availability of ambulances from other areas. "With this new service we will improve our response time significantly and lighten the pressure on ambulance staff operating currently within the Central Karoo communities" Minister Pierre Uys (2006) said. A benefit of the new service is that it increases availability of existing ambulances for emergency responses to local communities in the district thus reducing the overall mission time. The incidence of non-

compliance, as a result of shorter travel time to hospital, may be reduced by the strategic positioning of ambulance stations.

A further measure that may overcome the travel distance to hospitals is the introduction of an air ambulance service. The advanced life support services in the Southern Cape area received a substantial boost with the introduction of a medical emergency helicopter service in Oudtshoorn. At the opening of the base, Minister Uys said that the emergency helicopter service will provide advanced life support for critically ill or injured patients, effectively cutting the time of patient transport by road by about two-thirds and providing the very best chance for patient recovery. This will be especially useful in providing access to inaccessible areas and serving rural communities (Uys, 2006).

Figure 11 illustrates how introducing quality control will identify the gaps that could be filled by CPD. Improving the communication network will ensure adequate access to clinical support for rural ALS practitioners and how the strategic positioning of ambulance bases and helicopter services will reduce travel time to hospitals.

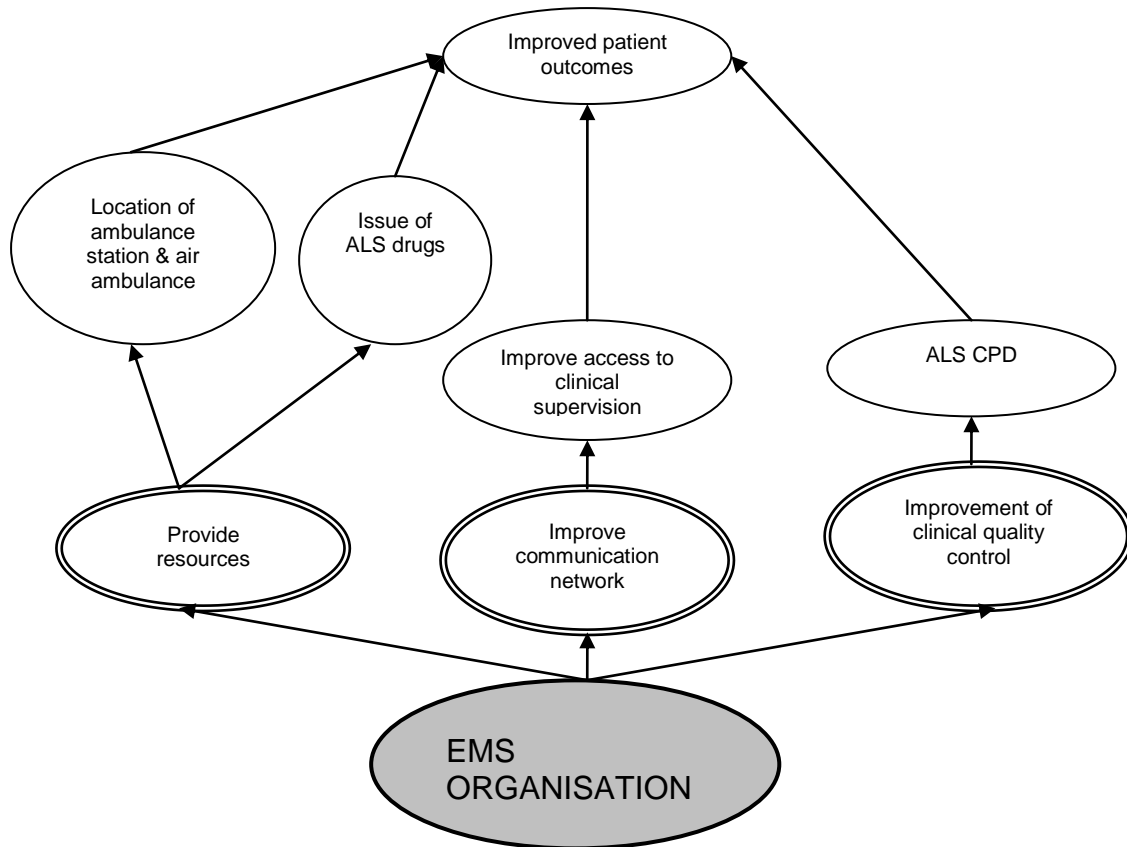


Figure 11. EMS organisational role in improving compliance

5.4. The PBECP Role in Improving Compliance

The PBECP is, through its mandate from the HPCSA, mainly responsible for the registration of emergency care practitioners; the regulation of education and training; and determining the scope of practice of emergency care practitioners and in so doing guides the profession and protects the public (Health Professions Council of South Africa, 2004). The guidelines and protocols that it produces and enforces are fundamental to fulfilling this responsibility.

An important finding of the research is that there is confusion about these guidelines and protocols as it relates to the status of independent practitioner. As one informant puts it: “I think you must know that the protocol is a guideline that’s the key thing” (P16). The guidelines and protocols that are published must provide clear unambiguous direction to ALS practitioners with regard to the terms of reference of their use. Specific questions need to be answered, namely when is deviation permissible, how does contacting a medical

practitioner affect the ALS practitioner's status as an independent practitioner, is clinical judgement more important than compliance and what are the possible medico-legal implications of non-compliance?

To date, neither the PBEC nor other regulatory Departments of Health have policy documents on "guidelines for the creation of guidelines" for ALS practitioners. Schwartz, et al. (1999: 1155) suggests several key attributes of good guidelines which should be considered by the Professional Board when developing and reviewing the guidelines and protocols. Firstly, they must consider face credibility that is the credibility accorded to the guidelines by the ALS practitioners who will use them. The team whose responsibility it is to generate these must be respected for their expertise and be representative of the ALS population (e.g. rural/urban). Validity of the guidelines can only be evaluated by determining whether they lead to the better management and outcome of patients. Even though South Africa is represented at ILCOR, there is no pre-hospital research contribution to ILCOR from South Africa. A study to determine if the guidelines lead to improvements in the practice may result in further improvements in the drafting of guidelines. This is also suggested by Participant 6: "Do studies, if it does not work, then increase the dose". Reproducibility is integral to decreasing inconsistency between the different guidelines as this creates confusion and renders the guidelines less credible. A review of guidelines from other authorities is necessary before starting any review. Representativeness ensures the guidelines are free from bias. The guidelines should take into account the views and experiences of those ALS practitioners that practice in unique environments where health resources are not readily accessible. In addition, clinical applicability is necessary to ensure that significant health problems and specific patient cohorts are defined in accordance with scientific, medical and health economic criteria. This will enable the practitioner to easily link the clinical presentation of the patient with the appropriate guideline. Flexibility to the above is important in identifying valid exceptions to recommendations and suggestions on how patient preference can be incorporated into the decisions made by the ALS practitioner. Due to the nature of emergency medicine, flexibility based on patient preference may be uncommon. Clarity obviates ambiguity and imprecision without necessarily

limiting clinical freedom. If a guideline is too specific, clinical decision making may be compromised. Guidelines must be reliable, meaning that they are interpreted by different practitioners in different environments in the same way. This will avoid regional differences in interpretation. Transparency establishes authority of the guidelines by making public the process in which they were generated. The HPCSA website and the PBECP newsletter can be effectively used to communicate changes to the PBECP guidelines and protocols. Finally the authority of guidelines must be maintained if they are at all to be adhered to. This may be achieved by continuous scheduled review of between three to five years. This links well with the ILCOR five year review policy.

The above guidelines for developing these documents are supported by different respondents as indicated by Participant 18 and others: “Experts ...must come together in a forum and give input”. The guidelines and protocols should be reviewed frequently and each review should be accompanied by a national CPD programme on the new changes as is suggested by Participants 15 and 19: “...the people that write the protocol don't update the change...” (P15). “The way the protocols can be introduced is through updates, case reviews and forums” (P19).

“They [the protocols] need to be updated often” (P15). This recommendation may not be practical because the PBECP guidelines and protocols set a standard. If this standard is in a constant state of flux, it would be difficult to hold practitioners accountable for non-compliance. The PBECP schedules the revision of the guidelines and protocols to coincide with the ILCOR recommendations.

“We need to get it right in terms of integrity” (P22). Consultation with other health professional bodies and organisations such as the Medical and Dental Professional Board, the Emergency Care Society of South Africa, and the South African Resuscitation Council would be prudent to ensure universal acceptance of the standard and approval by the HPCSA (Moody-Williams, et al. 2002:409).

The guidelines and protocols must align closely with international best practices and other nationally accepted guidelines such as the SAMF as is suggested by Participant 15: "...there are slight differences with the protocol and the SAMF". They must also consider local circumstances unique to South Africa's health systems, such as those found in rural areas: "In the past a lot of the information came from the [United] States [of America]" (P4).

The PBECP roles and responsibilities include the regulation the emergency care practitioner scope of practice, the regulation of education and training, taking disciplinary action against practitioners that transgress the rules of the PBECP and HPCSA and administering the emergency care practitioner registers. The PBECP has the legal authority to develop and publish guidelines and protocols for emergency care practitioners in terms of the HPCSA Act, 1974 (Act No.56 of 1974) and the subsequent regulations (No. R.1379 of 1994). Guidelines and protocols development must follow an accepted scientific process, as illustrated in Figure 12, to ensure acceptance and compliance. Note the division in the figure.

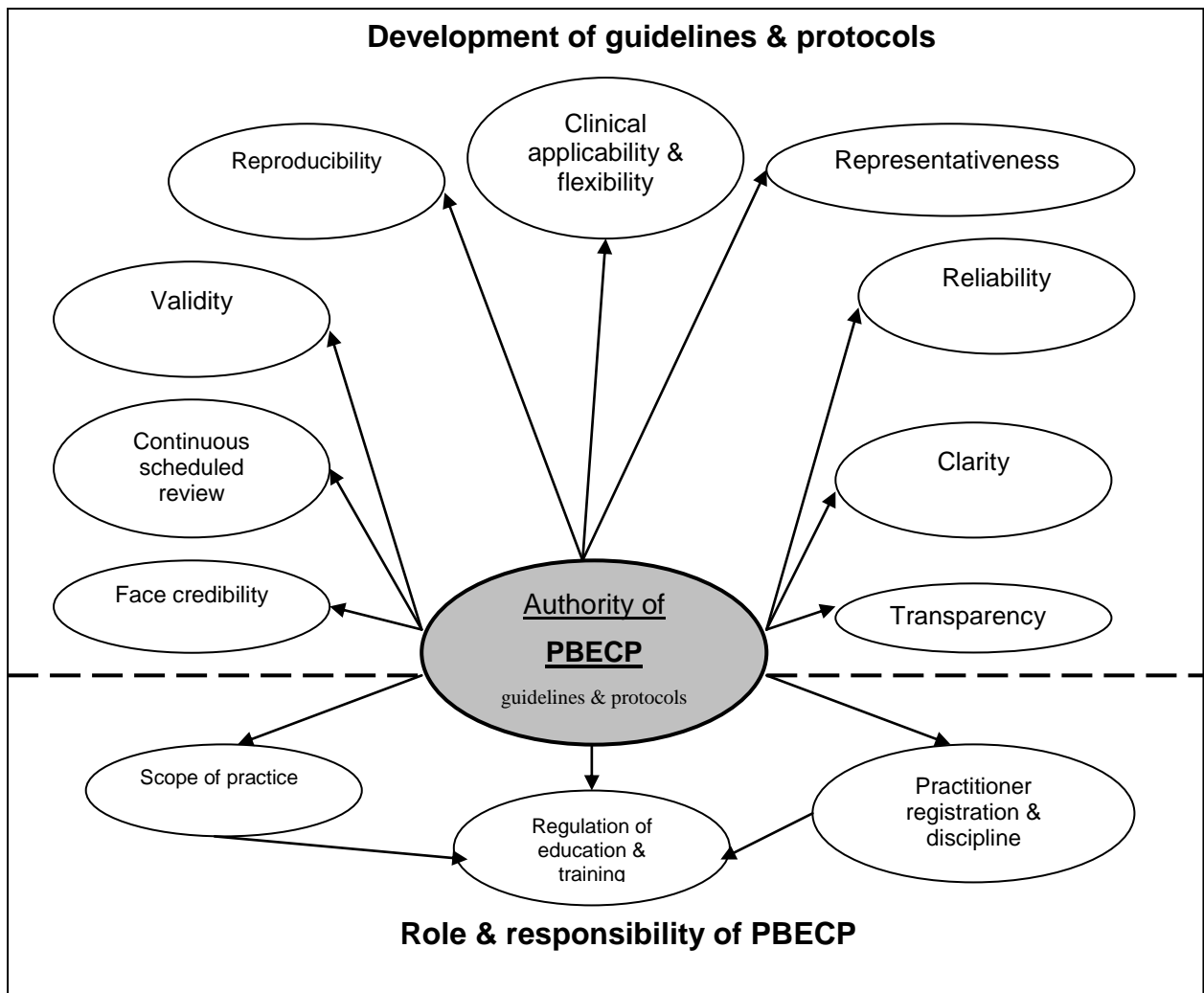


Figure 12. Roles and responsibilities of PBECP and the criteria for the development of guidelines and protocols

5.5. The Role of ALS Education in Improving Compliance

The PBECP has communicated the move away from short course training to formal education in the October edition of E.C. News (2006:2). This decision is supported by the findings on how the move to formal education can be used to improve compliance. Education can be used as an effective tool for change. The outcomes and curriculum of the ALS practitioner education and training must align with the role that the practitioner has to perform as part of a broader health care system. ALS practitioner education must be holistic and meet the academic, psychological and social needs to achieve transformational change in the learner.

As an independent practitioner, the ALS practitioner must be equipped with the knowledge, skills and behaviours that inculcate problem solving abilities, critical thought, scientific enquiry and reflection as is supported by Participant 12 “...you should have lateral thinking andan open mind”. These attributes will lay a foundation for the professional development and growth of the practitioner.

The educators engaged in ALS practitioner training and education must complete formal training such as the Post Graduate Certificate in Education. Employing operationally experienced ALS practitioners without the necessary educational background to teach is unlikely to result in the practice of outcomes-based education principles (Mekwa, 2000:278).

“Every college has its own way of training” (P18). To ensure that there is uniformity in the teaching, interpretation and classroom application of the PBECP guidelines and protocols, collaboration and external moderation between educational institutions is necessary.

The pharmacology curriculum content must explore to a greater depth the knowledge that an independent ALS practitioner requires to effectively administer drugs that may have significant side effects as is supported by Participant 21: “A solution is to adapt the training in such a way that if we are allowed a drug we allowed its full use, must be taught and be able to use it to the full extent”.

A senior paramedic confirmed in an interview that opportunities for life long learning and access to continuous professional development are required to facilitate the acquisition of new knowledge “...I would like to see ...mandatory continuing medical education”.

Figure 13 illustrates how formal education and training using the outcomes based education approach would provide the practitioner with the skills, knowledge and behaviour required for independent, professional practice. Formal education must address the discrepancies in lecturer education

qualifications and the inadequate pharmacology content taught to ALS practitioners. Collaboration between institutions with external moderation of examination will reduce discrepancies that may exist in the teaching of guidelines and protocols between institutions. CPD provides an opportunity for the practitioner to engage in life long learning. Critical and reflective review by the individual practitioner will help to identify gaps in knowledge and skills that can be addressed by participating in CPD activities. These gaps in knowledge should filter through and be included in the mainstream education of ALS practitioners.

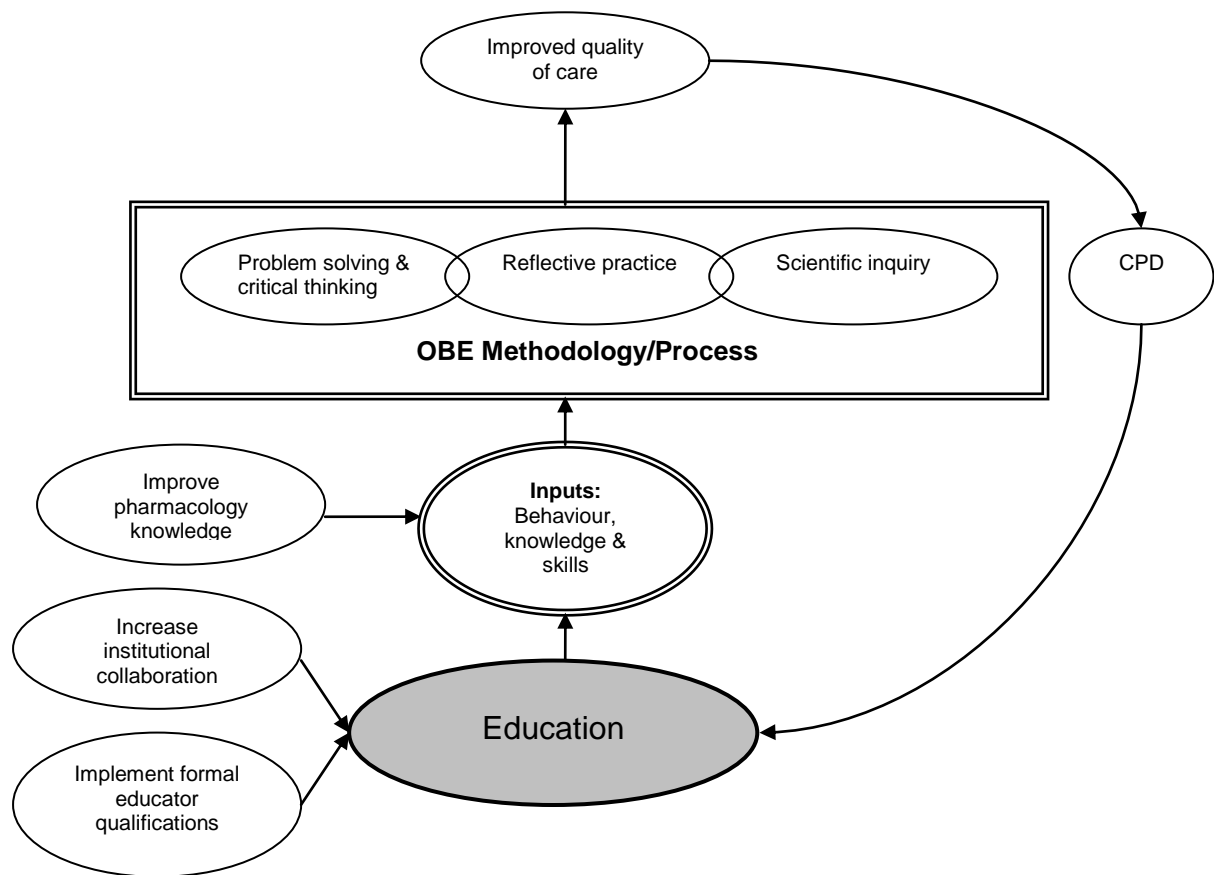


Figure 13. The role of ALS education in improving compliance

5.6. The Role of the ALS Practitioner in Improving Compliance

Any interventions to improve compliance must address the professional development of the ALS practitioner. “We need to get to the stage that we are actually a profession” (P16).

The apparent lack of intrinsic motivation to seek self improvement is raised by Participant 3: “...with doctor’s it’s their individual responsibility to update themselves, why can’t we paramedics be the same”? Reflective practice is supported by Participant 22 “Reflective practice will find out how we are doing”. “It’s a never ending task to expect people to police the system it has to be self motivated and self sustained”. The intrinsic need to improve ones knowledge and skill coupled with a critical appraisal of ones clinical performance may contribute not only to the professional development of the practitioner but also may improve compliance with guidelines and protocols.

“We need to start respecting each other and what we do” (P13). Professional respect between ALS practitioner and ALS practitioner and other health workers will improve once ALS practitioners are given the opportunity to work closely with other health professionals. “Once we work side by side there is going to be a whole new view on what paramedics are doing” (P1). Professional respect by other health professionals may encourage confidence in ALS practice and support compliance with the PBECP guidelines and protocols.

Self regulation, autonomy, independent practice and self determination of the profession are in place largely as a result of the formation of the Professional Board for Emergency Care Practitioners. The full implication of these professional responsibilities has not been realised by the profession as Participant 10 states: “You are an independent practitioner and you are responsible for your actions...”. The South African Medical Association represents medical practitioners and has as its objectives the promotion of the integrity and image of the medical profession, to provide medical practitioners with knowledge relevant to the demands of medical practice, the promotion of education, research and academic excellence, to encourage involvement in health promotion and education, to develop medical leadership and skills and to influence the health care environment to meet the needs and expectations of

the community by promoting improvements to health reform, policy and legislation (South African Medical Association, 2006). The formation of an ALS practitioner association to further the professional interests of the ALS practitioner is needed to address similar professional issues. Compliance with guidelines and protocols are in keeping with the objectives of the medical association.

The move to higher education is welcomed by Participant 16 who is an ALS practitioner that holds the Critical Care Assistant short course qualification. “I...think that all short courses should be done away with”. “To reach that level [of professionalism] we need to sort out the training”.

The ALS practitioner is on a continuum of development towards earning the title of a professional. The individual ALS practitioner does not guide and influence the realisation of the guidelines and protocols to the degree to which it is intended because the immaturity the profession has resulted in few opportunities for life long learning and formal education, current ALS clinical practice does not routinely include reflective practice, there is no ALS association to further the professionalism of the practitioner and there is a lack of professional respect from fellow health workers (See Figure 14).

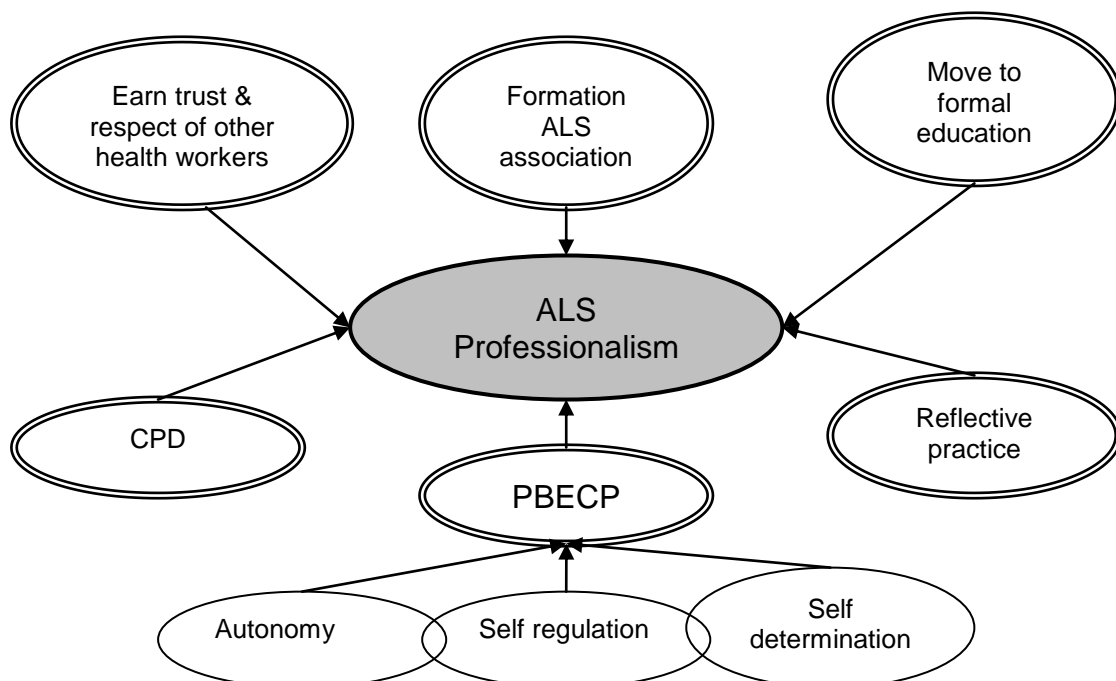


Figure 14. Factors that influence the professional development of ALS practitioner

5.7. Summary

The multi-system view that looks at each major category is necessary to understand the multifaceted pattern of non-compliance. While this is true, it is also ethically necessary that recommendations from this study have some immediate relevance that may decrease any potential risk to health care users and practitioners alike. To this end, the discussion on improvements to the EMS systems, ALS practitioner education and training are for medium to long term implementation. In the short term the recommendations with regards to the PBECP, as the quality assessor, are for immediate implementation and are discussed in the next chapter.

There are two important linkages that emerge from the findings as to how compliance can be improved. The key linkage that is evident in each major category is the lack of consultation with other stakeholders. There is a need for dialogue to take place between the NCEMS, the PBECP, institutions that offer ALS education and an association that would represent the ALS practitioners.

Another important category that is common is that of CPD. The ongoing professional development is seen as key to improving the overall compliance of the ALS practitioner with the PBECP guidelines and protocols. Internet access will allow for CPD to take place in rural areas, EMS can use clinical quality control information to identify CPD topics, CPD should be used to bring ALS practitioners up to date with the latest guideline and protocol review, students should attend CPD sessions to keep abreast of new developments and ongoing review is necessary for professional development.

Chapter 6

6.0. Conclusion and Recommendations

At the time when non-compliance was initially discussed with colleagues at the PBECP, it was readily ascribed to an isolated group of deviant practitioners that had not bothered to keep themselves updated. The extent and reasons for non-compliance were poorly understood.

As the findings of the study began to unfold, my perceptions as to the reasons for non-compliance began to change. The practitioner was no longer the only reason for non-compliance, other equally important categories started to emerge. Understanding the reasons for non-compliance is crucial to answering the second and more important question, that is, how can compliance be improved. Chapter 6 presents the conclusion and the recommendations on what can be done to improve compliance.

6.1. Conclusion

Practitioners that participated in the focus group discussions and interviews unanimously acknowledged that non-compliance with the guidelines and protocols is a common practice amongst ALS practitioners. The participants represented the spectrum of ALS practitioners in terms of years of experience, qualifications, private and public sector employment, gender, race, and urban and rural practice. It was evident that the participants identified with the purpose of the study and viewed their contribution as an opportunity to reflect on their own practices without risk of punitive action. The spontaneity of their responses, understanding and empathy with the study topic suggests some previous self-reflection after either witnessing non-compliance by other practitioners or themselves being non-compliant.

Agreement as to the reasons for non-compliance was evidenced by the repetition of the reasons for non-compliance given by different participants during different focus group discussions. At the conclusion of the third focus group discussion, it became evident to both the researcher and research assistant that little new information was emerging. This however, did serve as an endorsement of the findings of the previous discussion groups.

What is evident from the investigation is that there is a pattern of interrelated and complex factors that contribute towards the eventual non-compliance of ALS practitioners with the PBECP guidelines and protocols. The findings fall into five major categories, namely: the influences of the health system; the role of the EMS organization; the role of education and training; the role of the Professional Board and the professional status of the individual ALS practitioner. The combination of the factors ultimately leads to non-compliance.

A core category did not emerge immediately. At a point in the study, the research assistant pointed out that the researcher bias as the Chairperson of the PBECP was obstructing the view that the PBECP was at the core of non-compliance. However, after reorganising the major categories and subcategories, the core category that emerged was the ALS practitioner. The health system, EMS as the employer, the education and training that the practitioner receives and the role of the PBECP cannot individually be held accountable for non-compliance. Furthermore, non-compliance is not a universal amongst all ALS practitioners. The other categories help to create an environment that influences non-compliance to differing extents; however, the decision to be non-compliant is taken solely by the individual practitioner. What is important is that there is communication between all the role-players in order to seek solutions that will improve compliance. The interrelated role of the major categories and categories in influencing compliance is illustrated in Figure 15.

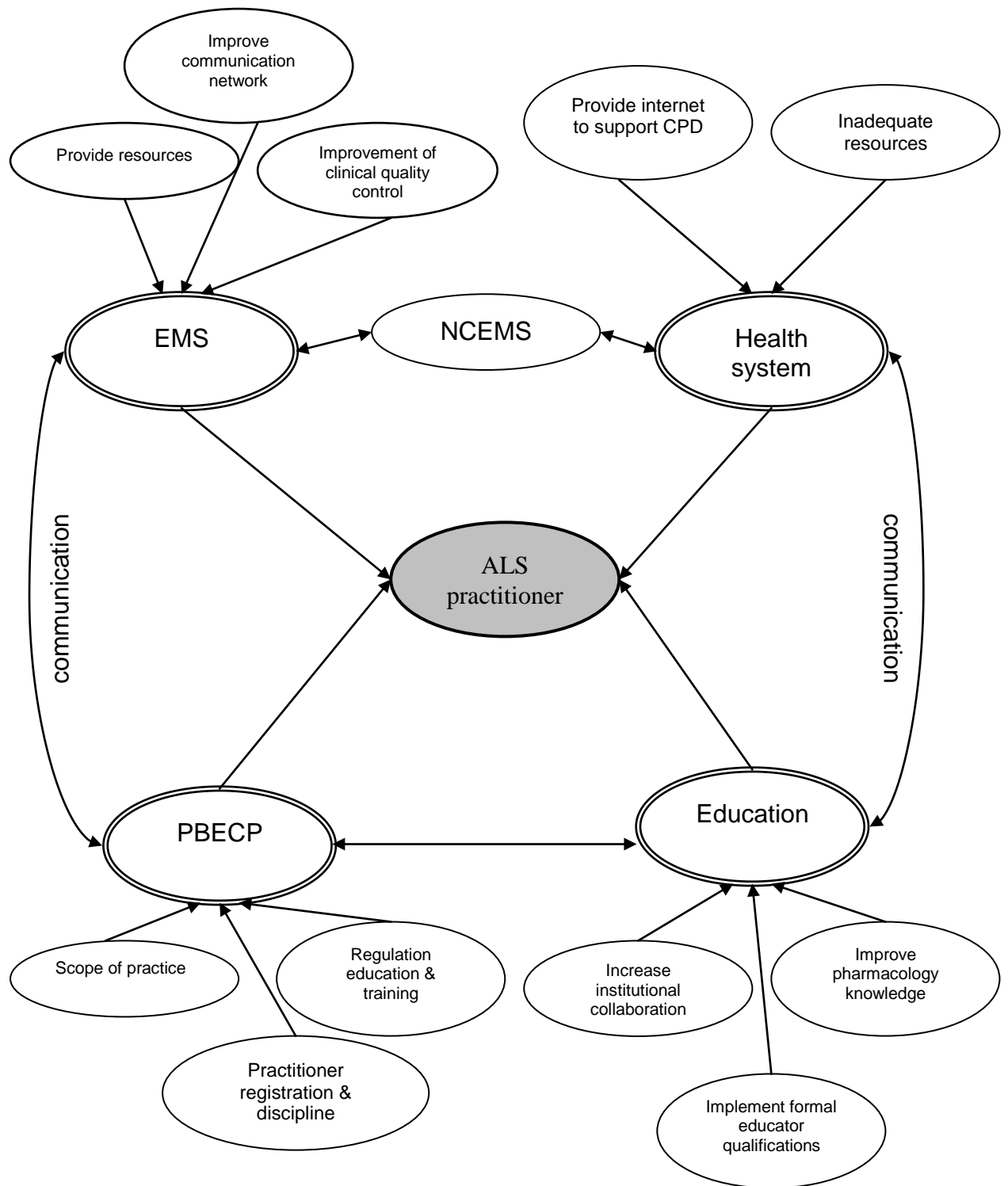


Figure 15. The interrelated role of the major categories to improve compliance, showing the ALS practitioner as central to the process

6.2. Recommendations

It is recommended the PBECP refrain from using the term protocol as protocols do not allow the practitioner to exercise clinical judgement based on individual patient requirements and would conflict with the independent status of the ALS practitioner.

This study has led to an understanding of the reasons that ALS practitioners are non-compliant with the PBECP guidelines. It would be prudent for the PBECP, as the custodian for the development, revision and implementation of guidelines for ALS practitioners, to consider the recommendations to decrease the incidence of non-compliance.

However, the onus to comply with any guidelines still rests with the individual, 'independent', 'professional' ALS practitioner. Any deviation from the PBECP guidelines must be clinically, ethically, legally and socio-economically justifiable.

EMS must create an enabling environment that supports ALS practice and the independence thereof.

6.2.1. Recommendations for PBECP interventions

The PBECP must provide clear specifications on the definition of independent practitioner in relation to the limitations to the scope of practice as published in the PBECP guidelines. It must also clearly specify when, how and what deviations from the guidelines may be exercised. The Board must provide medico-legal clarity on the general advice from medical practitioners. It is recommended that the Board develops a policy that will guide EMS organisations and limit their discretionary and selective implementation of aspects of the guidelines as well as provisioning of resources.

6.2.2. Education, Training and CPD

The PBECP must ensure that the learning outcomes and curriculum approved by the PBECP provides the ALS practitioner with the knowledge, attitudes and behavioural attributes that support the ALS practitioner's status as an

independent practitioner. Education institutions must ensure that any teaching practice that promotes memorisation of guidelines is not condoned. Revision of guidelines must be supported by a national awareness programme where practitioners will have an opportunity to engage with the changes. A CPD programme may be needed for practitioners that are ill equipped to implement the new changes due to past inadequacies in their education and training.

6.2.3. Role of the PBECP in Guideline Development

The PBECP must ensure future guidelines are developed in accordance with the attributes suggested by Schwatz et al. (1999)

- In the development of guidelines and protocols the Professional Board must consider face credibility. Due consideration must be given to the credibility of those who generate guidelines and for whom they are generated. To this end there is a need for ongoing consultation and review with all stakeholders,
- Validity of the guidelines can only be evaluated by determining whether they lead to the better management and outcome of patients,
- Reproducibility is integral to decrease inconsistency between the different guidelines as this creates confusion and renders the guidelines less credible,
- Representativeness, to ensure the guidelines are free from bias. In addition clinical applicability is necessary to ensure that significant health problems and specific patient cohorts are defined in accordance with scientific, medical and health economic criteria,
- Flexibility to the above is important in identifying valid exception to recommendations and suggestions for how patient preference can be incorporated into decision making,
- Clarity obviates ambiguity and imprecision without necessarily limiting clinical freedom,
- Guidelines must be reliable in that they are interpreted by different practitioner in different environments in the same way,

- Transparency establishes authority of the guidelines by making public the process in which they were generated,
- Finally the authority of guidelines must be maintained if they are at all to be adhered to. This may be achieved by continuous scheduled review of between three to five years.

6.3. Area for Future Study

This study investigated the non-compliance with PBECP guidelines and protocols by the ALS practitioners and not by the Basic and Intermediate Life Support practitioners. It is possible that the reasons for non-compliance and consequently the approaches to improving compliance might have been different to those for ALS practitioners. The Basic and Intermediate Life Support guidelines are significantly different and including these findings would have made an in-depth study difficult. This may be an area for any future study.

6.4. Closing Statement

The study was successful. The findings as to the reasons why ALS practitioners are non-compliant and how compliance can be improved are evident. The researcher and the research assistant, despite their significant combined experience, have gained new insights into rural ALS practice, the overall views of ALS practitioners to education, the shortcomings of the PBECP and the interpretation of the guidelines. The confusion as to what is a protocol and what is a guideline has been resolved. The direction that the PBECP has embarked upon with regards to replacing short course training with two year mid-level qualification and a four year professional qualification in emergency care is supported in the findings. The agreement on the importance of continuing professional development was unanimous. This project forms the beginning of knowledge that will help emergency medical care to evolve as a profession in South Africa.

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APPENDIX 01: DISUSSION GUIDE FOR FOCUS GROUP DISCUSSION



Focus Group Discussion Guide

Preamble: Welcome to this focus group discussion. There is evidence that some ALS practitioners do not follow the PBECP 2003 guidelines and protocols. The purpose of this discussion is to explore the reasons for this and identify what can be done about it.

1. What has been your experience of working with the PBECP 2003 guidelines and protocols?

2. What are the reasons that ALS practitioners are non compliant with the PBECP 2003 guidelines and protocols?
 - a. Are they too complex?
 - b. Are they suited for the pre-hospital environment?
 - c. Are the recommended drug dosages appropriate?

3. Are there any specific protocols or guidelines that are problematic?
 - a. Why or in what way?
 - b. Are there any protocols or guidelines that conflict with other guidelines that you are aware of?

4. What can be done to improve compliance?
 - a. Suggestions on how compliance can be improved?
 - b. How should new protocols and guidelines be introduced?

APPENDIX 02: INFORMATION GIVEN TO PARTICIPANTS



22 February 2006

Letter of Information

Title of research project: An investigation into the non-compliance of advanced life support practitioners with the guidelines and protocols of the Professional Board for Emergency Care Practitioners

Name of Investigator: Lloyd Christopher (083 3269428)

Name of Assistant: Navin Naidoo (082 337 2647)

Dear ALS Practitioner

I am a student registered with the Department of Emergency Medical Care and Rescue, Durban University of Technology. You are requested to take part in my research study. The purpose of the study is to investigate why some advanced life support practitioners in the Western Cape do not comply with the PBECP 2003 guidelines and protocols and how compliance with PBECP protocol guidelines can be improved.

I am conducting this research for the purpose of my Masters in Technology: Emergency Medical Care qualification. This study does not have anything to do with my role as Chairperson of the PBECP or Principal of the Academy of Emergency Care. Your participation in this study will in no way prejudice you as a registered advanced life support emergency care practitioner.

I have selected you for participation as you are an ALS practitioner practicing in the Western Cape. As such you have valuable perceptions and views and would be regarded as a participant in the research. This research is intended to benefit our profession not find fault with practitioners.

If you agree to participate, you will be required to be a one of six participants in a focus group discussion. The discussion will last no more than one hour. The preliminary venue for the discussion will be the board room at the Academy of Emergency Care. The actual date, time and place will be arranged to accommodate all invited participants. Proceedings will be voice tape recorded (if you agree) and notes will be taken by a research assistant. This person is also an ALS practitioner, who is a lecturer in the Academy of Emergency Care at Cape Peninsula University of Technology. A copy of the transcript of the proceedings will be made available to you on request and you will be given an opportunity to correct any statements that you feel do not reflect your opinion.

Participation is entirely voluntary and you will have the right to withdraw consent and discontinue participation in the study at any time without prejudice. You will not be made to answer any question that you do not wish to answer. You will not be asked about your own practice. It is your perceptions of reasons for non-compliance by other ALS practitioners that are being sought.

Information from the study will be coded and not contain any identifying details to ensure confidentiality. You will not be personally identified in any publication containing the results of the study. All participants in the discussion group as well as the researcher and his assistant will be required to sign a written undertaking to keep all information shared in the discussion confidential.

The audio tapes and written material from the study will be kept in a locked cabinet and destroyed after three years. This material will be used solely by the investigator, his supervisor and research assistant.

The findings of the study will be made available to you on request.

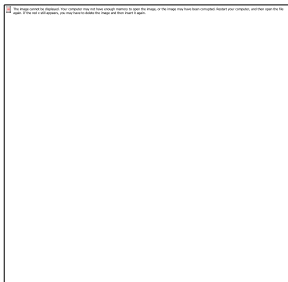
No discomfort or risks are anticipated. It is hoped that you will enjoy the sharing your knowledge and experience with fellow colleagues.

The research supervisor, Dr Linda Grainger (Tel.: 031 3085402) will be available to answer any questions you may have concerning the study, the procedures, and any risks or benefits that may arise from you participation in the study.

Thanking you

L. Christopher

APPENDIX 03: INFORMED CONSENT DOCUMENT



INFORMED CONSENT

(To be completed in duplicate by the participant)

TITLE OF RESEARCH PROJECT: An investigation into the non-compliance of advanced life support practitioners with the guidelines and protocols of the Professional Board for Emergency Care Practitioners

NAME OF SUPERVISOR: Dr L Grainger (PhD) (Durban Institute of Technology, Tel.: 031 30854020)

Date: _____

PLEASE CIRCLE THE APPROPRIATE ANSWER

1. Have you read the information sheet? YES/NO
2. Have you had the opportunity to ask questions regarding the study? YES/NO
3. Have you received satisfactory answers to your questions? YES/NO

4. Have you had the opportunity to discuss this study? YES/NO
5. Have you received enough information about this study? YES/NO
6. Who have you spoken to? _____
7. Do you understand the implications of your involvement in the study? YES/NO
8. Do you understand that you are free to withdraw from this study? YES/NO
 a) at any time, and
 b) without having to give reasons for withdrawing
9. Do you agree to voluntarily participate in this study? YES/NO

If you have answered “NO” to any of the above questions please obtain the information before signing.

PARTICIPANT NAME: _____ SIGNATURE: _____

WITNESS NAME: _____ SIGNATURE: _____

RESEARCH STUDENT: _____ SIGNATURE: _____

APPENDIX 04: PAGE EXTRACTS FROM 2003 PBECP GUIDELINES & PROTOCOLS

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HEALTH PROFESSIONS COUNCIL

OF SOUTH AFRICA

**PROFESSIONAL BOARD FOR
EMERGENCY CARE PERSONNEL**

**ADVANCED LIFE SUPPORT
PRACTITIONER
PROTOCOLS
JANUARY 2003**

ALS PRACTITIONER PROTOCOLS

**PROFESSIONAL BOARD FOR
EMERGENCY CARE PERSONNEL**

**HEALTH PROFESSIONS COUNCIL
OF SOUTH AFRICA**

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**DEPT: PROFESSIONAL BOARDS: GROUP B
SENIOR MANAGER: J H COETZER**

IMPORTANT NOTICE TO ALL REGISTERED PARAMEDICS

Herewith the booklet containing the most recently approved Medications, Protocols, Capabilities, Regulations and Ethical Rules for Registered Paramedics as approved by the Professional Board for Emergency Care Personnel (PBECP).

It is imperative that you familiarise yourself with the entire content thereof, as this document and the inherent recommendations and guidelines replace all previous versions and publications issued under the authority of the Professional Board for Emergency Care Personnel.

Any comment or enquiries in this regard can be directed in writing to Mr E. Chanza, the Secretary of the Professional Board for Emergency Care Personnel, at the above address or via email on EmmanuelC@hpcs.co.za

Yours sincerely
T. Justus
Chairperson
PBECP

2 January 2003

ALS PRACTITIONER PROTOCOLS

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PLEASE TAKE CAREFUL NOTE

These documents are intended to serve as guidelines for the treatment of patients by registered paramedics and do not replace sound clinical judgement.

Consultation with fellow paramedics or colleagues in challenging or difficult situations is strongly advocated.

It is your medico-legal responsibility to ensure that all the necessary and appropriate documentation is duly completed and processed.

All doses, unless otherwise specified, must be calculated according to each patient's individual requirements.

It is implied, that where applicable, that intraosseous injection / infusion doses are as for intravenous doses.

The general principal of drug administration is that of titrating the minimum dose against the desired effect / response.

The onus rests upon the paramedic to ensure that he/ she is adhering to the correct and most recently approved standards and guidelines.

ALS PRACTITIONER PROTOCOLS

MEDICATIONS

ALS PRACTITIONER PROTOCOLS

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ALS PRACTITIONER PROTOCOLS

ACETYL SALICYLIC ACID - ASPIRIN

DESCRIPTION:

- Classification
: Non-steroidal anti-inflammatory / platelet aggregation inhibitor
- Schedule : 1

PHARMACOLOGICAL ACTION:

- Prostaglandins are responsible for:
 - Somatic pain
 - Inflammatory reaction
 - Hyperthermia
 - Bronchodilation
 - Gastric mucosa protection
 - Platelet aggregation
 - Uterine contractions
 - Patency of foetal ductus arteriosus
- Aspirin inhibits the production of prostaglandins and thereby leads to the opposite effects as noted above, as well as inhibiting the production of SRS-A, which can cause acute anaphylaxis

ADVERSE EFFECTS:

- Anaphylactic reaction (some patients, especially asthmatics exhibit notable sensitivity to aspirin, which may provoke various hypersensitivity / allergic reactions)
- Bronchoconstriction in asthmatics
- Gastric mucosa irritation (dyspepsia; peptic ulceration; peptic bleeding)
- Bleeding tendency
- Foetal distress due to obliteration of foetal ductus arteriosus
- Suppression of uterine contractions

INDICATIONS:

- Suspected myocardial infarction
- Decompression sickness

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to aspirin
- Bronchial asthma
- Peptic ulceration
- Bleeding tendency
- Patients already receiving Platelet Aggregation Inhibitors or Anticoagulants
- Pregnancy
- Children <12
- Severe renal impairment/ renal transplant

RECAUTIONS:

- Patient must be conscious

PACKAGING:

- Junior aspirin : 150mg tablet
- Regular aspirin : 300mg tablet
- Double strength : 500mg tablet
- Disprin CV : 100mg tablet (purpose-produced for anti-coagulation)

DOSAGE AND ADMINISTRATION:

- Administer 150mg - 300mg orally, chewed, crushed, or dissolved

ACTIVATED CHARCOAL

DESCRIPTION:

- Classification : Carbon
- Schedule: : 1

PHARMACOLOGICAL ACTION:

- Activated charcoal adsorbs many poisonous compounds to its surface, thereby reducing their absorption by the GIT

ADVERSE EFFECTS:

- The patient may experience mild constipation

INDICATIONS:

- To assist in the treatment of certain cases of overdoses and poisonings where the agent/s was/were orally ingested

CONTRA-INDICATIONS:

- There are no absolute contra-indications, but there are a number of poisonings where it is ineffective and may cause further problems:
 - Of no value in poisonings due to methanol, caustic acids and alkalis, iron tablets or lithium
 - Cyanide poisoning
 - Unprotected airway in a patient with decreased level of consciousness
- Do not use if the container was not properly sealed (de-activation due to moisture exposure)

PRECAUTIONS:

- It should not be administered simultaneously with Ipecac in order to avoid vomiting and thus possible aspiration of activated charcoal
- Patients with a decreased level of consciousness need to be intubated before activated charcoal can be administered via a nasogastric tube

PACKAGING:

- Fine black powder in bottles of 25g and 50g

DOSAGE AND ADMINISTRATION:

- Adult and Paediatric: 0.5g/kg - 1g/kg mixed with water, given orally or administered via the nasogastric tube

ADENOSINE

DESCRIPTION:

- Classification : Endogenous purine nucleoside
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Conduction in SA and AV node: slows inward Ca^{2+} flow and therefore decreases automaticity and rate of discharge in SA and AV node cells
- Adenosine is produced from the breakdown (de-phosphorylation) of ATP
- It blocks the influx of Ca^{2+} by inhibiting cAMP formation
- The above therefore terminates supraventricular arrhythmias due to re-entry pathways involving the AV node (i.e. most PSVTs)
- SVT's that do not involve the AV node (eg. Wolf-Parkinson-White syndrome) are sometimes also terminated by Adenosine, however, this is not true for atrial flutter, atrial fibrillation or ventricular tachycardia
- Adenosine does not adversely affect conduction through accessory pathways (e.g. Bundle of Kent)

PHARMACO-KINETICS:

- Half life : 10 seconds
- Onset of action : immediate
- Duration of action : 1-2 minutes

INDICATIONS:

- Stable patients with symptomatic Paroxysmal Supra-Ventricular (narrow-complex) Tachycardia

CONTRA-INDICATIONS:

- Known hypersensitivity
- Sick sinus syndrome
- Underlying second or third degree AV heart block
- Avoid in patients taking Dipyridamole
- Atrial flutter
- Atrial fibrillation
- Poisoning / drug induced tachycardia

ADVERSE EFFECTS:

- Transient in effects
- CVS:
 - Vasodilation
 - Flushing
 - Light-headedness
 - Headache
 - Hypotension
 - Arrhythmias
 - Chest pain
 - Palpitations
 - Transient sinus bradycardia / asystole
 - Ventricular ectopics
- Other:
 - Paresthaesia
 - Diaphoresis
 - Dyspnoea
 - Bronchoconstriction
 - Nausea
 - Metallic taste in mouth
 - Chest tightness

PRECAUTIONS:

- Brief arrhythmia and asystole (up to 30 seconds) may be present after conversion
- Constant ECG monitoring during administration
- Less effective in patients taking Theophyllin
- Patient must be supine during administration

PACKAGING:

- 6mg/2ml glass vial

DOSAGE AND ADMINISTRATION:

Adults:

- 6mg IVI slam* (followed immediately by 20ml NaCl IVI push)
- 12mg IVI slam* (after 2 minutes) if no response
- 12mg IVI slam* (after 2 minutes) may be considered

Children:

- 0.1mg/kg IVI slam* (followed immediately by 5ml NaCl IVI push)
- 0.2mg/kg IVI slam* (after 2 minutes) if no response
- 0.2mg/kg IVI slam* (after 2 minutes) may be considered
- Max. : First dose : 6mg
- : Subsequent doses : 12mg

NOTE:

- An IVI slam is an extremely rapid IVI push using the “two syringe” technique

ADRENALINE/ EPINEPHRINE

DESCRIPTION:

- Classification : Sympathomimetic
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Both α and β adrenergic activity
- The primary beneficial effect of epinephrine in cardiac arrest is due to its potent α effects:
 - Increased peripheral vasoconstriction
 - Improved coronary and cerebral blood flow
 - Renders ventricular fibrillation more susceptible to defibrillation

α -EFFECTS

- Vasoconstriction (smooth muscle contraction):
 - Increased peripheral resistance
 - Increased systolic and diastolic blood pressure
 - Decreased skin, GIT and renal blood flow
- Mydriasis
- Diaphoresis, erection of hair (piloerection)
- Intestinal and urinary bladder sphincter constriction
- Increased breakdown of glycogen to glucose

β_1 -EFFECTS

- Myocardium:
 - Positive inotrope
 - Positive chronotrope
 - Positive dromotrope
 - Increased myocardial oxygen consumption

β_2 -EFFECTS

- Skeletal muscle : contraction
- Bronchial smooth muscle : relaxation
- Vascular smooth muscle : vasodilation
- Bladder smooth muscle : relaxation
- Intestinal smooth muscle : decreased peristalsis
- Uterine smooth muscle : relaxation
- Glycogen stores : breakdown of glycogen to glucose

PHARMACO-KINETICS:

- Onset of action: immediately

ADVERSE EFFECTS:

a- EFFECTS

- Acute hypertension (risk of cerebral haemorrhage or acute pulmonary oedema)
- Nausea and vomiting
- Cold, clammy skin
- Acute renal failure
- Urinary retention
- Diplopia
- Hyperglycaemia
- Vasoconstriction:
 - Gangrene of fingers, toes, nose or ear if administered locally
 - Tissue necrosis from extravasation

β_1 -EFFECTS

- Tachycardia / palpitations
- Arrhythmias / cardiac arrest
- Myocardial ischaemia

β_2 -EFFECTS

- Tremors, cramps
- Restlessness, anxiety, confusion, headache

INDICATIONS:

- Cardiac arrest
 - Ventricular fibrillation, Pulseless ventricular tachycardia, Pulseless Electrical Activity, Asystole
- Resistant symptomatic bradycardia unresponsive to oxygenation
- Anaphylaxis
 - Upper airway obstruction due to inflammation e.g:
 - Upper airway infection
 - Burns
 - Catastrophic / severe asthma (last resort)
 - Severe hypotension not due to hypovolaemia
 - Beta-blocker / calcium channel blocker toxicity

CONTRA-INDICATIONS:

- There are no absolute contra-indications in an emergency setting

PRECAUTIONS:

- Do not mix with alkaline solutions (e.g. sodium bicarbonate)
- Hypertension
- Myocardial ischaemia, congestive cardiac failure
- Diabetes Mellitus
- Hyperthyroidism
- Pregnancy
- Stimulant abuse (e.g. cocaine)

PACKAGING:

- Ampoules: 1mg/1ml (1:1000)/ 0.1%
- Various pre-filled syringes designed to deliver predetermined doses

DOSAGE AND ADMINISTRATION:

A. CARDIAC ARREST

Adults:

- Intravenous
: 1mg IVI push
- Endotracheal
: 2x IVI dose, diluted to 10ml with NaCl
- Repeat
: every 3 minutes
- Constant infusion : post-cardiac arrest hypotension (SBP<70 mmHg) 2-10µg/min - titrating against effect

Children:

- Intravenous
: 0.01mg/kg IVI push
- Endotracheal
- Newborn (at birth) : 0.01mg/kg, diluted to 3ml with NaCl
- All other children : 0.1mg/kg, diluted to 3-5ml with NaCl
- Repeat
: every 3 minutes
- Constant infusion : post-cardiac arrest hypotension 0.1-1µg/kg/min - titrating against effect

B. SYMPTOMATIC BRADYCARDIA

Adult infusion:

- 2-10µg/min
- Titrate against effect

Children:

- Intravenous bolus : 0.01mg/kg IVI push every 3 minutes
- Endotracheal bolus : 0.1mg/kg every 3 minutes
- Infusion : 0.1-1µg/kg/min - titrating against effect

C. ANAPHYLACTIC SHOCK/ CATASTROPHIC OR SEVERE ASTHMA

Adults:

Intramuscular:

- Initial : 0.5mg
- Repeat : every 5 minutes
- Titrate against effect
- Undiluted

Intravenous (only if decreased cerebral perfusion):

- Caution - extremely dangerous
- Initial : 0.1-0.2mg IVI slowly
- Repeat : every 5 minutes
- Titrate against effect
- Diluted
- Dilute 1mg to 10ml with NaCl (i.e. 1:10 000)
- Further dilute 1 ml of 1:10 000 solution to 10ml with NaCl (1:100 000)
- Only administer IVI epinephrine to an unconscious patient
- Continuous ECG monitoring is important

Nebulization (stridor or bronchoconstriction):

- Mild : 1mg Epinephrine + 4ml NaCl
- Moderate : 2mg Epinephrine + 3ml NaCl
- Severe : 3mg Epinephrine + 2ml NaCl

Children:

Intramuscular:

- Initial : 0.01mg/kg
- Repeat : every 5 minutes
- Titrate against effect
- Undiluted

Intravenous (only if decreased cerebral perfusion):

- Caution - extremely dangerous
- Initial : 0.01mg/kg IVI slowly
- Repeat : every 5 minutes
- Titrate against effect

- Diluted
- Dilute 1mg to 10ml with NaCl (1:10 000)
- Further dilute 1 ml of 1:10 000 solution to 10ml with NaCl (1:100 000)
- Only administer I.V. epinephrine to an unconscious child
- Continuous ECG monitoring is important

Nebulization (stridor or bronchoconstriction):

- Mild : 0.5mg Epinephrine + 4.5ml NaCl
- Moderate : 1mg Epinephrine + 4ml NaCl
- Severe : 2mg Epinephrine + 3ml NaCl

AMIODARONE HYDROCHLORIDE

DESCRIPTION:

- Classification : Anti-arrhythmic
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Amiodarone (an iodine-containing agent) is a very effective anti-arrhythmic medication that has a profound effect on the sodium, potassium and calcium channels of the cardiac cells whilst simultaneously blocking both α and β adrenergic receptors

PHARMACO-KINETICS:

- Elimination half-life : 40 days

ADVERSE EFFECTS:

- Vasodilation / hypotension
- Negative inotropic effects
- Negative chronotropic effects
- Prolongation of QT interval

INDICATIONS:

- Refractory pulseless ventricular tachycardia or ventricular fibrillation
- Stable ventricular tachycardia
- Polymorphic ventricular tachycardia
- Wide complex tachycardia of uncertain origin
- As an adjunct to electrical cardioversion of refractory PSVTs, atrial tachycardias and for drug induced cardioversion of atrial fibrillation (particularly when associated with a rapid ventricular rate)

CONTRA-INDICATIONS:

- Atrioventricular block
- Sinus bradycardia
- Sino-atrial block
- Allergy to Iodine
- Severe hypokalaemia
- Porphyria
- Prior use of Lignocaine hydrochloride

PRECAUTIONS:

- MUST be diluted with 5% Dextrose
- Not recommended for paediatrics

PACKAGING:

- 150mg/3ml ampoule

DOSAGE AND ADMINISTRATION:

A. REFRACTORY PULSELESS VENTRICULAR TACHYCARDIA OR VENTRICULAR FIBRILLATION

- Administer 300mg IVI as a rapid bolus
- If ventricular fibrillation or pulseless ventricular tachycardia do not respond to defibrillation 1 minute post administration (or recurs after successful defibrillation), consider the administration of additional dosages of 150 mg every 3-5 minutes
- Infusion: following successful defibrillation with Amiodarone, a slow intravenous infusion of 1mg/minute (360mg IV over 6 hours) may be administered
- Maximum cumulative dose of 2.2g IV/24 hours

B. VENTRICULAR TACHYCARDIA / SUPRAVENTRICULAR TACHYCARDIA

- 150mg IVI over 10 minutes (15mg/min)
- This may be repeated every 10 minutes, titrating against the effect
- Infusion: a slow IVI of 1mg/minute (360mg over 6 hours)
- Maximum cumulative dose of 2.2g IV/24 hours

ATROPINE SULPHATE

DESCRIPTION:

- Classification : Anti-cholinergic
- Schedule : 2

PHARMACOLOGICAL ACTION:

- Atropine acts as a competitive antagonist at muscarinic (cholinergic) receptor sites, blocking the stimulation of parasympathetic nerve fibres
- Atropine (anti-cholinergic) effects:
 - Heart: supraventricular conductive tissue
 - Positive inotrope
 - Positive chronotrope
 - Positive dromotrope
 - Eyes : mydriasis
 - Exocrine glands : decreased sweat, tears, salivary and pancreatic secretions
 - Lungs : bronchodilation
 - Digestive system : decreased peristalsis, sphincter constriction
 - Urinary : bladder relaxation, sphincter constriction

PHARMACO-KINETICS:

- Half-life : 2 - 4 hours
- Onset of action : Immediate

ADVERSE EFFECTS:

- Confusion, restlessness
- Mydriasis (72hrs), diplopia, photophobia, blurred vision
- Dry mucous membranes: mouth, eyes, respiratory and digestive tract
- Tachycardia, palpitations, arrhythmias, paradoxical bradycardia
- Dry, hot, flushed skin
- Acute urinary retention
- Constipation, nausea, vomiting

INDICATIONS:

- Symptomatic bradycardia, associated with signs or symptoms of shock: (chest pain, dyspnoea, decreased level of consciousness, hypotension, pulmonary oedema, congestive cardiac failure, AMI)
- Bradycardia (< 60) associated with:
 - Multiple (> 6/minute) Ventricular Extra Systoles
- Repeated intubation attempts in paediatric patients
- Asystolic cardiac arrest in adults
- Pulseless electrical activity with bradycardia
- Organophosphate poisoning

CONTRA-INDICATIONS:

- Not indicated for use in neonates
- There are no absolute contra-indications in an emergency setting

PRECAUTIONS:

- First rule out other causes of bradycardia:
 - e.g. hypoxia, hypothermia, head injuries (raised intra-cranial pressure), and healthy, asymptomatic athletes)
- Second degree type II and third degree AV heart blocks with wide QRS complexes (indicating a possible point of origin below the supraventricular conductive tissue) as atropine may induce a paradoxical slowing of the heart rate
- Children are more prone to a paradoxical bradycardia in reaction to small dosages due to an active parasympathetic nervous system
- Ischaemic heart disease, hypertension

PACKAGING:

0.5mg/1ml glass / plastic ampoule
0.6mg/1ml glass / plastic ampoule
1.0mg/1ml glass / plastic ampoule
1.2mg/1ml glass / plastic ampoule

DOSAGE AND ADMINISTRATION:

Treat all reversible causes of bradycardia

A. ASYSTOLE/ P.E.A. - BRADYCARDIA

Adults:

- Intravenous : 1mg IVI push
- Endotracheal : 2 x IVI dose
- Repeat : every 3 minutes
- Maximum : 0.04mg/kg (3mg) IVI or 0.08mg/kg (6mg) ET
= total vagolytic dose

Children:

- Not recommended

B. SYMPTOMATIC BRADYCARDIA

Adults:

- Intravenous : 0.5mg IVI push
- Repeat : 0.5-1mg every 3 minutes
- Maximum : 0.04mg/kg (3mg) = total vagolytic dose

Children:

- Intravenous : 0.02mg/kg IVI push
- Repeat : once, after 3 minutes
- Max single dose : 0.5mg (child); 1mg (adolescent)
- Min single dose : 0.1mg
- Maximum total : 0.04mg/kg = total vagolytic dose

C. ORGANOPHOSPHATE POISONING

Adults:

- Intravenous : 0.5 - 2mg IVI
- Repeat : every 3 minutes until atropinization occurs
- Titrate against effect
- No absolute maximum dosage

Children:

- Intravenous : 0.02mg/kg
- Repeat : every 3 minutes until atropinization occurs
- Titrate against effect
- Min single dose : 0.1mg
- No absolute maximum dosage

β₂ STIMULANTS

DESCRIPTION:

- Classification
- : Bronchodilators
- Schedule : 2 - Aerosol
- : 3 - Inhalant solutions and unit dose vials
- : 4 - Ampoules

PHARMACOLOGICAL ACTION:

- Hexoprenaline, Fenoterol and Salbutamol are selective β₂ stimulants acting on the β₂ receptors in the lungs:
 - Bronchial smooth muscle : bronchodilation
- At higher/repeated dosages, the systemic absorption progressively increases, thus acting on other organs with β₂ receptors e.g.
 - Skeletal muscle : contraction
 - Vascular smooth muscle : vasodilation
 - Bladder smooth muscle : relaxation
 - Intestinal smooth muscle : decreased peristalsis
 - Uterine smooth muscle : tocolysis
 - Glycogen stores : break down of glycogen to glucose
- At higher/repeated dosages, the selectivity is also progressively lost and β₁ effects (myocardium) are experienced:
 - Positive inotrope
 - Positive chronotrope
 - Positive dromotrope
 - Increased myocardial oxygen consumption

PHARMACO-KINETICS:

- Onset of action : 5-15 minutes
- Duration of action : 3-6 hours

ADVERSE EFFECTS:

- Tremors, restlessness, anxiety, confusion, headache
- Hypotension
- Tachycardia, palpitations
- Cramps
- Nausea, vomiting
- Urinary retention
- Tocolysis
- Hyperglycaemia

INDICATIONS:

- Acute bronchospasm
- Premature or obstructed labour

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to β_2 stimulants
- Neonates

PRECAUTIONS:

- Special caution must be used when a patient presents with a pulse rate greater than 120 beats / minute
- Intravenous β_2 stimulants should be used with caution in patients with:
 - Ischaemic heart disease, cardiac arrhythmias, cardiac failure
 - Occlusive vascular disorders, hypertension, hypotension
 - Hyperthyroidism, diabetes mellitus
 - Prostate hypertrophy

PACKAGING:

- Fenoterol : Berotec aerosol : 100 μ g
: Resp. solution : 1mg/ml
: UDV : 1.25mg/2ml or 0.5mg/2ml
: IV solution :
- Hexoprenaline : Ipradol aerosol : 100 μ g
Sulphate
: Resp. solution : 0.25mg/ml
: UDV :
: IV solution : 5 μ g/2ml or 25 μ g/10ml
- Salbutamol : Ventolin aerosol : 100 μ g
: Resp. solution : 5mg/ml
: UDV : 2.5mg/2.5ml or 5mg/2.5ml
: IV solution : 0.5mg/ml or 1mg/ml

DOSAGE AND ADMINISTRATION:

A. ACUTE BRONCHOSPASM

Aerosol:

• 2 puffs may be administered by the patient or paramedic during an episode, which may then be repeated every 2 minutes
Inhalant solution: (use half the dosage for paediatrics)

- 2ml Fenoterol (1.25mg/2ml)(UDV) + 3ml NaCl
- 2ml Fenoterol (0.5mg/2ml) (UDV) + 3ml NaCl (paediatric solution)
- 1ml Fenoterol solution (1mg/ml) + 4ml NaCl
- 2ml Hexoprenaline (0.25mg/ml) + 3ml NaCl
- 1ml Salbutamol (5mg/ml) + 4ml NaCl
- Repeat if necessary

Ampoules:

Adults:

- Dilute 5µg IV Hexoprenaline with 8ml NaCl = 5µg/10ml
- Administer 1ml/min (total of 5µg/10 min)
- Repeat once if necessary

Paediatrics:

- 3-6 months : 1µg Hexoprenaline diluted to 10ml IVI over 10 minutes
- 6-12 months : 2µg Hexoprenaline diluted to 10ml IVI over 10 minutes
- 1-3 years : 3µg Hexoprenaline diluted to 10ml IVI over 10 minutes
- 3-10 years : 4µg Hexoprenaline diluted to 10ml IVI over 10 minutes

B. PREMATURE / OBSTRUCTED LABOUR

Hexoprenaline:

Bolus:

- Dilute 5µg IV Hexoprenaline with 8ml NaCl = 5µg/10ml
- Administer 1ml/min until:
 - Total of 5µg/10 min
 - Mothers' heart rate > 120bpm
 - Contractions cease

Maintenance Infusion:

- 0.3µg – 0.45µg/min

CALCIUM CHLORIDE 10%

DESCRIPTION:

- Classification : Electrolyte/ mineral
- Schedule : 1

PHARMACOLOGICAL ACTION:

- Calcium is essential for the initiation and maintenance of normal muscular contractions
- Calcium has a positive inotrope effect on the cardiac muscle
- In addition, calcium aids general vasoconstriction (vascular smooth muscle)

ADVERSE EFFECTS:

- Tissue necrosis (if extravasation occurs)
- Thrombophlebitis
- Vasospasm (coronary and cerebral vessels)

INDICATIONS:

Any of the following suspected cardiac arrest/ pre-arrest conditions:

- Hyperkalaemia (indicated by flattened p-waves, broadened QRS complexes, tall peaked t-waves e.g. renal failure, severe tissue damage crush syndrome)
- Calcium channel blocker toxicity (e.g. verapamil)
- β blocker toxicity (e.g. propranolol)
- Hypocalcaemia (e.g. massive blood transfusion)
- Hypermagnesaemia

CONTRA-INDICATIONS:

- Not for routine use in cardiac arrest unless the above indications are present
- There are no absolute contra-indications in cardiac arrest
- Not indicated for use in neonates

PRECAUTIONS:

- Rapid administration may cause bradycardia/ asystole
- Use cautiously in patients receiving Digitalis
- May induce increased cardiac irritability
- Never combine with sodium bicarbonate in the same infusion
- May cause precipitations
- Never administer via the endotracheal route
- Well placed and free flowing IVI line is mandatory

PACKAGING:

- 1g/10ml (10%) glass/plastic ampoule

DOSAGE AND ADMINISTRATION:

Adults:

- 10ml of calcium chloride 10% solution, slowly IVI
- If being administered pre-arrest, administer at 1ml/min

Children:

- 0.2ml/kg of calcium chloride 10% solution, slowly IVI
- If being administered pre-arrest, administer at 1ml/min

CORTICOSTEROIDS

DESCRIPTION:

- Classification : Corticosteroids
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Corticosteroid hormones are produced by the adrenal cortex that acts via messages to the cell nucleus (slow onset of action)
- Physiological release follows a circadian rhythm, being maximal at 08h00 and minimal at 24h00 (high incidence of nocturnal asthma attacks in children)
- Inhibition of inflammatory/ allergic reactions
- Suppression of antibody production
- Stabilization of mast cell membranes
- Restoration of β_2 receptor responsiveness (up-regulation) of receptors

PHARMACO-KINETICS:

Hydrocortisone Methylprednisolone

- Half-life 8-12 hours 18-36 hours
- Approximate equivalent IV dose 5 mg 1 mg

ADVERSE EFFECTS:

- Side effects occur following prolonged use and are of little consequence in an emergency setting

INDICATIONS:

- Acute hypersensitivity / allergic reactions
- Management of bronchospasm due to allergic and inflammatory disorders/ anaphylaxis

CONTRA-INDICATIONS:

- There are no absolute contra-indications in the emergency setting

PRECAUTIONS:

- There are no applicable precautions in the emergency setting

PACKAGING:

- Hydrocortisone:
100mg/2ml or 500mg/4ml
- Methylprednisolone:
40mg/ml or 125mg/2ml or 500mg/8ml or 1000mg/16ml

DOSAGE AND ADMINISTRATION:

Adults:

- Hydrocortisone:
200mg - 500mg IVI slowly
- Methylprednisolone:
62.5mg - 125mg IVI slowly

Children:

- Hydrocortisone:
5mg/kg IVI slowly
- Methylprednisolone:
1mg/kg IVI slowly (maximum dose 30mg)

DEXTROSE 50%

DESCRIPTION:

Classification : Carbohydrate

Schedule : 1

PHARMACOLOGICAL ACTION:

- Monosaccharides (basic units/ building blocks of carbohydrates)
- Because monosaccharides are the most basic units to which all carbohydrates are broken down, glucose is therefore immediately available as a source of energy

ADVERSE EFFECTS:

- Local irritation of vein
- Thrombophlebitis
- Extravasation
- Local tissue necrosis
- Hyperosmolarity
- Diuresis
- Hyperglycaemia

INDICATIONS:

- Acute management of symptomatic hypoglycaemia
- HGT < 4.4mmol/l

CONTRA-INDICATIONS:

- There are no absolute contra-indications in the presence of true symptomatic hypoglycaemia
- Do not administer dextrose routinely during resuscitation unless there is confirmed hypoglycaemia

PRECAUTIONS:

- Dehydration and hypovolaemia
 - High concentrations of IVI dextrose cause an increase in osmolarity that draws H₂O from the cells and causes diuresis, aggravating dehydration
 - Dehydration / hypovolaemia and hypoglycaemia must be corrected simultaneously
- Intracranial haemorrhage
 - Glucose leaking into the cerebral tissue will aggravate the injury and result in cerebral oedema
 - Careful titration in all head injured patients is vital
- Renal failure
 - Excessive glucose is excreted through the kidneys

All complications and adverse effects can be prevented by:

- Limiting the use of dextrose to symptomatic hypoglycaemic patients
- Administering dextrose slowly through a free-flowing IV line
- Re-assessing the HGT 5 minutes post administration
- Avoiding hyperglycaemia
- Never combine dextrose and sodium bicarbonate in the same infusion (i.e. hyperosmolarity)

PACKAGING:

- 20/ 50ml ampoules of a 50% solution (0.5g/ml)
- 50ml vacolitre containing a 50% solution

DOSAGE AND ADMINISTRATION:

Adults:

- 10g (20ml of a 50%) slowly IVI
- Repeat every 5 minutes should blood glucose remain low

Children:

- 1ml/kg of a 50% solution which is then diluted to a 25% solution
- Repeat every 5 minutes should blood glucose remain low

Neonates:

- 1ml/kg of a 50% solution which is then diluted to a 12.5% solution with sterile water*
- Repeat every 5 minutes should blood glucose remain low

NOTE:

- If blood glucose remains low after 3 doses, reassess patient, equipment and administration technique
- Treat the patient and not the test result
- * Sterile water is indicated in neonates due to the risk of hypernatraemia with NaCl boluses

ORAL GLUCOSE POWDER/ GEL

DESCRIPTION:

- Classification : Carbohydrate
- Schedule : 1

PHARMACOLOGICAL ACTION:

- Administration of an oral glucose solution / preparation provides a source of soluble carbohydrates to the tissues in order to raise the blood glucose levels

ADVERSE EFFECTS:

- Hyperglycaemia

INDICATIONS:

- Acute management of hypoglycaemia in a conscious patient
- HGT < 4,4mmol/l

CONTRA-INDICATIONS:

- Decreased level of consciousness

PRECAUTIONS:

- Patient must be lateral if unconscious
- Avoid aspiration

PACKAGING:

- 25g and 50g powder sachet
- 25g and 50g gel

DOSAGE AND ADMINISTRATION:

- 25g of gel applied to the oral mucosa of the patient with a gloved finger
- Preferably dilute powder in glass of water if patient is conscious
- Repeat after 5 minutes should blood glucose remain low

ALS PRACTITIONER PROTOCOLS

DIAZEPAM

DESCRIPTION:

- Classification : Sedative/ hypnotic/ anti-convulsant
- Schedule : 5
- Antidote : Flumazenil

PHARMACOLOGICAL ACTION:

- Diazepam is a benzodiazepine acting on the central nervous system
- These actions result from the potentiation of the neural inhibition that is mediated by GABA
- It has anxiolytic, sedative, sleep-inducing, anticonvulsant and muscle relaxant properties
- It can also cause anterograde amnesia

PHARMACO-KINETICS:

- Elimination half-life : 20-70 hours
- Onset of action : 1-5 minutes
- Duration of action : 15-120 minutes

ADVERSE EFFECTS:

- CNS : Depression
- Resp : Depression (rapid administration)
- CVS : Hypotension (large dosages)
- Nausea, vomiting
- Diplopia
- Thrombophlebitis
- Paradoxical excitation
- Physical and psychological dependence

INDICATIONS:

- Anti-convulsive therapy
- Sedation
- Muscle relaxant

CONTRA-INDICATIONS:

- Known hypersensitivity/ allergy to benzodiazepines

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In a patient with persistent convulsions, there are no other absolute contra-indications, but due to its ability to cause respiratory depression, it must not be used if the patient cannot be artificially ventilated should the need arise

PRECAUTIONS:

- Respiratory disorders:
 - COPD / asthma / hypoventilation
- Cardiovascular disorders:
 - Hypotension / hypovolaemia / congestive cardiac failure
- Psychosis:
 - No anti-psychotic effects
 - May increase agitation
- Active Labour:
 - Neonatal suppression
- Rule out all reversible causes of convulsions e.g. hypoglycaemia
- In IM injections absorption is erratic and unreliable
- Elderly, debilitated and paediatric patients are more sensitive to the adverse effects
- Alcohol, barbiturates, narcotics and other depressants acting on the central nervous system may enhance / alter the effects of diazepam
- Do not mix diazepam with any other drug or solution unless advised otherwise by the manufacturers instruction brochure

PACKAGING:

- 10mg/2ml amber coloured ampoule

DOSAGE AND ADMINISTRATION:

- Only administer during active convulsions
- Do not dilute, unless advised otherwise by the manufacturers instruction brochure

Adults:

- Sedation/ convulsions 5 mg/min slowly IVI (0.15mg/kg)
- Repeat every 2 - 5 minutes
- Titrate against effect (use the lowest effective dosage)
- Maximum 20mg
- Rectally 10mg (maximum 20mg)

Children:

- Sedation / convulsions 0.2 mg/kg slowly IVI

- Repeat every 2 - 5 minutes
- Titrate against effect (use the lowest effective dosage)
- Maximum : children > 5 years : 10mg
- : children < 5 years : 5mg
- Rectally : 0.5 mg/kg (maximum 1mg/kg)

FLUMAZENIL

DESCRIPTION:

- Classification : Benzodiazepine antagonist
- Schedule : 5

PHARMACOLOGICAL ACTION:

- Binds to GABA receptors (competing with benzodiazepines)
- Flumazenil is a benzodiazepine antagonist that specifically blocks the central effects of agents acting through the receptor-receptor complex by competitive inhibition

PHARMACO-KINETICS:

- Half-life : 60 minutes
- Onset of action : 1-2 minutes
- Duration of action : 45 minutes

ADVERSE EFFECTS:

- CVS:
 - Flushed skin
 - Thrombophlebitis
 - Arrhythmias
 - Hypertension
 - Chest pain
- CNS:
 - Excitation
 - Convulsions
- General:
 - Acute benzodiazepine withdrawal in dependant patients
 - Tremors and involuntary movements

INDICATIONS:

- Reversal of central nervous system sedative effects and respiratory depression due to benzodiazepines alone
- Coma (non-traumatic)

CONTRA-INDICATIONS:

- Known hypersensitivity
- Suspected Tricyclic Anti-depressant overdose
- Unknown mixed-drug overdose
- Patients with a high risk of convulsions
- Neonates

PRECAUTIONS:

- Suspected benzodiazepine addiction
- The half-life is shorter than that of most benzodiazepines (therefore monitor for recurrent respiratory depression)

PACKAGING:

- 0.1mg/1ml 10ml ampoule = 1.0mg
- 0.1mg/1ml 5ml ampoule = 0.5mg

DOSAGE AND ADMINISTRATION:

Adults:

- Initial bolus : 0.2mg slowly IVI
- Repeat : 0.1mg at 1 minute intervals
- Max dose : 1mg

Children:

- Safety has not been established

FUROSEMIDE

DESCRIPTION:

- Classification : Diuretic
- Schedule : 3

PHARMACOLOGICAL ACTION:

- Furosemide is a loop diuretic acting primarily by inhibiting electrolyte (Na⁺) and fluid re-absorption in the ascending limb of the loop of Henlé
- Loop diuretics increase the excretion of sodium, chloride, potassium, calcium and magnesium. Water follows passively
- In patients with pulmonary oedema, furosemide increases systemic venous capacitance, thereby decreasing left ventricular filling pressure (pre-load)

PHARMACO-KINETICS:

- Half-life : 30-90 minutes
- Diuretic action : within 5 minutes
- Duration of action : 120 minutes

ADVERSE EFFECTS:

- Hyponatraemia

- Hypokalaemia
- Hypotension
- Hypovolaemia
- Hyperuricaemia / gout
- Tinnitus and deafness (following rapid IVI administration)

INDICATIONS:

- Acute pulmonary oedema of cardiac, hepatic or renal origin
- Hypertensive emergencies

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to furosemide or sulphonamides
- Systolic blood pressure < 90 mmHg
- Hypovolaemia / dehydration

PRECAUTIONS:

- Urinary obstruction or retention
- Patients with hypokalaemia
- Elderly patients are particularly susceptible to dehydration and hypotension

PACKAGING:

- 20mg in 2ml ampoule
- 50mg in 5ml ampoule
- 250mg in 25ml ampoule

DOSAGE AND ADMINISTRATION:

Adults and Children:

- 0.5mg - 1mg/kg IVI slowly over 1-2 minutes

GLYCERYL TRINITRATE

DESCRIPTION:

- Classification : Vasodilator
- Schedule : 3

PHARMACOLOGICAL ACTION:

- Nitrates cause dilation of the venous system, which decreases venous return (pre-load) and decreases myocardial wall tension
- This improves sub-endocardial perfusion
- Nitroglycerin dilates the coronary arteries, antagonises coronary vasospasm and increases coronary collateral blood flow to the ischaemic myocardium

PHARMACO-KINETICS:

- Half-life : 1-4 minutes
- Onset of action : 1-3 minutes
- Duration of action : 30-60 minutes

ADVERSE EFFECTS:

- Headache
- Hypotension
- Tachycardia
- Flushed skin

INDICATIONS:

- Angina pectoris
- Acute myocardial infarction
- Acute pulmonary edema
- Hypertensive emergency

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to nitrates
- Children
- Hypotension (SBP < 90 mmHg)
- Decrease in blood pressure > 10%
- Sildenafil (Viagra) taken during the preceding 24 hours
- Bradycardia / severe tachycardia
- Right inferior ventricular infarction

PRECAUTIONS:

- Patient must be positioned in semi-fowlers or supine position prior to drug administration
- Do not administer simultaneously with other vasodilators

- Do not shake the aerosol prior to administration

PACKAGING:

- Nitrolingual spray container containing 200 x 0.4mg atomized sprays
- Tablets, 0.5mg in amber coloured container

DOSAGE AND ADMINISTRATION:

- One spray / tablet onto the oral mucosa (preferably sub-lingual)
- Repeat every 5 minutes if no improvement noted
- Maximum of 3 sprays/ tablets
- Terminate administration if systolic blood pressure (SBP):
 - Decreases by more than 10% in a normotensive patient
 - Decreases by more than 30% in a hypertensive patient
 - Measures lower than 90 mmHg

IPRATROPIUM BROMIDE

DESCRIPTION:

- Classification : Bronchodilators - inhalants
- Schedule : 2

PHARMACOLOGICAL ACTION:

- Ipratropium bromide causes relaxation of bronchial muscles due to its anti-cholinergic effects (blocks parasympathetic system)
- Its bronchodilation action is particularly effective in conjunction with β_2 -stimulants

PHARMACO-KINETICS:

- Onset of action : 30 minutes
- Duration of action : 4-6 hours

ADVERSE EFFECTS:

- With larger / repeated dosages, it is absorbed from the lungs into the systemic circulation resulting in systemic anti-cholinergic effects
 - Tachycardia
 - Dry, hot skin
 - Mydriasis
 - Urinary retention

INDICATIONS:

- To be used in conjunction with β_2 -stimulants for acute bronchospasm

CONTRA-INDICATIONS:

- Known hypersensitivity to ipratropium bromide or other anti-cholinergic drugs
- Children up to the age of 4 years

PRECAUTIONS:

- The onset of action is only after 30 minutes, which is much longer than the β_2 -stimulants

- The duration of action is 4 - 6 hours, which is also longer than the β_2 -stimulants

PACKAGING:

- Unit dose vial (UDV) containing 0.25 mg or 0.5 mg/2ml
- Aerosol spray (home medication) 0.04mg
- Nebulizer solution (bottle) 0.25mg/ml

DOSAGE AND ADMINISTRATION:

Adults:

UDV:

- Ipratropium bromide 0.5mg + appropriate β_2 stimulant + balance of NaCl to a total of 5ml solution
- Nebulised over 10 minutes
- May be repeated

Aerosol:

- The patient or paramedic may administer this during an episode. Two puffs of ipratropium bromide are administered if no improvement occurs following β_2 stimulant administration
- May be repeated

Children 5 years and older:

- Use half the adult dose
- Ipratropium bromide 0.25mg + appropriate β_2 stimulant + balance of NaCl to a total of 5ml solution
- Nebulised over 10 minutes
- May be repeated

NOTE:

- Ipratropium bromide + β_2 stimulant have a synergistic effect
- May be particularly useful in patients with bronchospasm who have taken beta-blockers

LIGNOCAINE HYDROCHLORIDE/
LIDOCAINE (Systemic)

DESCRIPTION:

- Classification : Ventricular anti-arrhythmic
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Conduction in SA and AV node has a slow inward Ca²⁺ flow (adenosine and Ca²⁺ antagonists blocks the flow of Ca²⁺ and therefore mainly affects supra-ventricular conduction)
- All other myocardial tissues (including His-Purkinje system) have a fast inward Na⁺ flow. Lidocaine blocks the flow of Na⁺ and K⁺ ions in ischaemic cells and therefore mainly affects the ventricular conduction
- Lidocaine acts as a membrane stabilizer resulting in the following effects:
 - Inhibition of fast sodium channels
 - Termination of ectopic beats
 - Shortened action potential duration
 - Decreased myocardial excitability
 - Protection of myocardium against arrhythmias
 - In toxic doses though, lignocaine will cause generalised myocardial suppression

PHARMACO-KINETICS:

- Half-life : 1-2 hours
- Onset of action : Immediate
- Duration of action : 10-20 minutes

ADVERSE EFFECTS:

- Early signs of systemic toxicity include, numbness of the tongue and peri-orbital region
- The main systemic toxic effects are central nervous system excitation evidenced by:
 - Restlessness
 - Muscle twitching
 - Convulsions
- This is followed by central nervous system depression evidenced by:
 - Drowsiness
 - Respiratory failure
 - Coma
- There is a simultaneous cardiovascular system depression:
 - Hypotension
 - Bradycardia
 - Cardiac arrest

INDICATIONS:

- Ventricular fibrillation
- Ventricular tachycardia
- Symptomatic / unstable ventricular ectopic beats:
 - Runs
 - Frequent (> 6/min)
 - Ventricular bigeminal / trigeminal rhythm
 - Coupled beats (salvos / triplets)
 - Multi-focal ectopics
 - R on T phenomenon
 - Associated with AMI
- Wide-complex tachycardia of unknown origin

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to lignocaine
- Heart blocks (second or third degree AV blocks)
- Bradycardia
- Hypotension not due to ventricular arrhythmia
- Severe sinus node dysfunction
- Accelerated idioventricular rhythm
- Prior use of Amiodarone Hydrochloride

PRECAUTIONS:

- Caution must be exercised in the presence of:
 - Geriatrics
 - Impaired liver function
 - Left ventricular failure
- Discontinue immediately if signs of toxicity occur

PACKAGING:

- 50mg/5ml (1%) ampoule
- 100mg/5ml (2%) ampoule
- 500mg/5ml (10%) ampoule
- 1000mg/5ml (20%) ampoule

DOSAGE AND ADMINISTRATION:

ADULTS:

A. STABLE VENTRICULAR TACHYCARDIA/ SYMPTOMATIC VENTRICULAR ECTOPICS/ WIDE COMPLEX TACHYCARDIA

- Loading dose : 1mg/kg slow IVI
- Repeat loading dose : 0.5mg/kg every 5 minutes
- Maximum (for loading dose) : 3mg/kg
- Note: administration of bolus doses must be terminated when:
 - A maximum of 3mg/kg has been administered
 - The blood pressure drops by >10 mmHg
 - Ventricular arrhythmias cease
 - Signs of toxicity develop
- Then establish a maintenance infusion of 1-4mg/min
- Repeat the loading dose (0.5-1mg/kg) if the maintenance infusion was started >15 minutes after the last loading dose
- Geriatrics (> 65 years) should receive half the adult dose for the bolus and infusion

B. UNSTABLE VENTRICULAR TACHYCARDIA (i.e. decreased level of consciousness, hypotension, pulmonary oedema, congestive cardiac failure or acute myocardial infarction)

- Synchronised cardioversion according to protocol
- Follow with a loading dose and maintenance infusion once successful (see A)
- If the ventricular tachycardia recurs after successful cardioversion, cardiovert again using the last successful joules. Once successful, administer another bolus dose (0.5-1mg/kg) of lignocaine and continue the infusion. Should this reoccur, continue repeating this process, administering up to a maximum bolus dose of 3mg/kg in total. Consider increasing the infusion's administration rate up to a maximum of 4mg/min.
- Should the monitor not discharge on synchronous mode, asynchronous cardioversion must be performed in order to avert any further delays in an already seriously compromised patient

C. VENTRICULAR FIBRILLATION

- Cardiac arrest protocol
- Administer a bolus dose of 1mg/kg IVI push (or 2mg/kg ET) followed by 0.5mg/kg IVI (or 1mg/kg ET) every 5 minutes
- Maximum total dose of 3mg/kg IVI or 6mg/kg ET
- Defibrillate one minute after each dose of lignocaine if cardiac arrest persists

D. POST DEFIBRILLATION/ SYNCHRONISED CARDIOVERSION

- Follow with loading dose and maintenance infusion (see A)

CHILDREN:

- As for adults, except maintenance infusion is 20-50 µg/kg/min

LIGNOCAINE HYDROCHLORIDE/ LIDOCAINE
(Local anaesthetic)

DESCRIPTION:

- Classification : Local anaesthetic
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Lidocaine spray has a local anaesthetic action when applied to mucous membranes
- The direct administration of a local anaesthetic agent into tissues induces the absence of sensation to a localized area of the body. Brief surgical (suturing) or dental procedures are the most common indications for local anaesthesia
- The anaesthetic may be applied topically to the surface of the mucous membrane or injected subcutaneously
- Lidocaine spray is ineffective when applied to intact skin

PHARMACO-KINETICS:

- Onset of action : 2-5 minutes
- Duration of action : 10-15 minutes
- Effects may, however, last for up to 3 hours with the addition of a vasoconstrictor (e.g. epinephrine)

ADVERSE EFFECTS:

- Signs of toxicity are the same as for systemic lidocaine administration
- Early signs of systemic toxicity include numbness of the tongue and peri-orbital region
- The main systemic toxic effect is central nervous system excitation evidenced by:
 - Restlessness
 - Muscle twitching
 - Convulsions
- This is followed by central nervous system depression evidenced by:
 - Drowsiness
 - Respiratory failure
 - Coma
- There is a simultaneous cardiovascular system depression:
 - Hypotension
 - Bradycardia
 - Cardiac arrest

INDICATIONS:

- Local anaesthesia
- Endotracheal intubation
- Suturing
- Intraosseous infusion placement (conscious patients)
- Femoral vein cannulation placement (conscious patients)

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to lidocaine
- Pre-hospital personnel should not use lignocaine anaesthetic injection for suturing purposes unless advice is sought from a suitable practitioner
- Lidocaine (with epinephrine as a vasoconstrictor) must not be used in areas supplied by end arteries e.g. fingers, toes, nose and ears
- Gunshot wounds, dog bites, human bites, or wounds where the tendons have been separated should not be sutured pre-hospital
- An aseptic technique must otherwise be adhered to

PACKAGING:

- Aerosol : 10 mg/spray discharge
- Injection cartridge : 20mg/ml (1.8 ml)
- Multi-dose vial : 100mg/10ml (1%), 200mg/10ml (2%)

DOSAGE AND ADMINISTRATION:

TOPICAL SPRAY:

- Administer 2 sprays onto identified area
- Use the minimum effective dose

INJECTION FOR LOCAL ANAESTHESIA:

- Infiltrate the skin with lidocaine, sufficient to produce local anaesthesia or as discussed with a suitably qualified practitioner
- Dose/kg
 - 1-3mg/kg (maximum dose) without adrenaline
 - 1-6mg/kg (maximum dose) with adrenaline

MEDICAL OXYGEN

DESCRIPTION:

- Classification : Naturally occurring atmospheric gas

PHARMACOLOGICAL ACTION:

- Oxygen is an odourless, tasteless, colourless gas present in the atmosphere at a concentration of approximately 21%
- It reverses the deleterious effects of hypoxaemia on the brain, heart and other vital organs
- Expired air contains 16-17% oxygen
- During optimal active CPR only 25-30% of the normal cardiac output is maintained and for these reasons supplemental oxygen should be administered

INDICATIONS:

- Glasgow Coma Scale of less than 15/15
- Any patient with abnormal vital signs
- Any respiratory insufficiency or arrest
- Acute decompensation of COPD
- Confirmed or suspected hypoxia
- Chest pain of medical or trauma origin
- Multiple or severe trauma
- Cardiac arrest
- Toxic inhalations
- Prophylactically during air transportation
- Scuba diving accidents

CONTRA-INDICATIONS:

- There are no absolute contra-indications for the use of oxygen in the emergency setting

PRECAUTIONS:

- High concentrations of oxygen may reduce the respiratory drive of a COPD patient; therefore, careful monitoring of the patient is required. Do not withhold oxygen from these patients if their prevailing condition is such that oxygen is required

- Long exposures to high concentrations of oxygen may result in retrolental fibroplasia in neonates and pulmonary fibrosis
- Neonates with a patent ductus arteriosus (PDA - a rare condition characterised by a significant heart murmur). Signs of hypoxia may occur after oxygen administration. Remove oxygen if PDA is confirmed
- Oxygen supports combustion - do not use in the presence of fire, smoke or cigarette smoking
- High pressure oxygen should not be used with oil or grease based substances as it causes an exothermic reaction with the risk of explosion
- Production of oxygen super radicals in the presence of Paraquat

PACKAGING:

- Pressurised cylinder containing 100% medical oxygen

DOSAGE AND ADMINISTRATION:

- Administered via:
 - Oxygen masks
 - Nasal cannulae
 - Bag-valve-mask / tube-reservoir device
 - Nebulizer device
 - Jet insufflation
- At the correct flow rate the following devices will deliver approximately the following percentages of oxygen:
 - Sampson's neonatal = 2 - 4 litres/minute
 - Simple face mask = 35 - 60% at 6 - 10 litres/minute
 - 24% and 28% face masks
= 4 litres/minute or as / manufacturer's instructions
 - 35% and 40% face masks
= 8 litres/minute or as / manufacturer's instructions
 - Nasal cannulae
= 24 - 40% at 1 - 5 litres/minute ($20\% + (l/min \times 4) = \%$)
 - Partial re-breather mask = 60% at 10 - 15 litres/minute
 - Non-re-breather mask = 95% at 10 - 15 litres/minute
 - Bag-valve-mask/tube = 50% at 12 - 15 litres/minute
 - Bag-valve- mask/ tube-
reservoir device
= 100% at 12 - 15 litres/minute
 - Adequate flow rate = Reservoir bag inflated > 2/3 at all times

NOTE:

- Oxygen is a non-explosive gas

METOCLOPRAMIDE MONOHYDROCHLORIDE

DESCRIPTION:

- Classification : Anti-emetic
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Metoclopramide acts on the chemo-emetic trigger zone (CETZ) to produce a central anti-emetic effect
- With regard to the gastrointestinal tract, metoclopramide enhances the motility of smooth muscle from the oesophagus through the proximal small bowel and accelerates gastric emptying and the transit of intestinal contents from the duodenum to the ileo-caecal valve

PHARMACO-KINETICS:

- Half-life : 4-6 hours

ADVERSE EFFECTS:

- CNS
 - Extra-pyramidal effects
 - Depression
- GIT
 - Diarrhoea
 - Abdominal cramps

INDICATIONS:

- Nausea and vomiting due to:
 - Stimulation of CETZ by medication (e.g. morphine)
 - Motility disorders of the GIT (e.g. gastro-enteritis)

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to metoclopramide
- CNS : Epilepsy
- GIT : Haemorrhage, obstruction, perforation, or post-operative
- Children : Increased incidence of extra-pyramidal effects

PRECAUTIONS:

- Pregnancy and lactation
- Elderly
- Not effective against direct stimulation of Vomiting Centre (e.g. emotional, visual, olfactory or labyrinthine disorders or motion sickness)
- In Parkinson's disease, metoclopramide increases extra-pyramidal effects

PACKAGING:

- 10mg/2ml ampoule

DOSAGE AND ADMINISTRATION:

- Adults > 60 kg : 10 mg slowly IVI/ IMI
- Adults < 60 kg : 5 mg slowly IVI/ IMI

MIDAZOLAM

DESCRIPTION:

- Classification : Sedative / hypnotic
- Schedule : 5
- Antidote : Flumazenil

PHARMACOLOGICAL ACTION:

- Midazolam is a benzodiazepine, acting on the central nervous system
- These actions result from the potentiation of the neural inhibition that is mediated by GABA
- It has anxiolytic, sedative, sleep-inducing, anticonvulsant and muscle relaxant properties
- It causes anterograde and retrograde amnesia

PHARMACO-KINETICS:

- Half-life : 1.5-2.5 hours
- Onset of action : 1-3 minutes
- Duration of action : 30 minutes
- 2-3 times more potent than diazepam
- Rapidly absorbed after IMI injection

ADVERSE EFFECTS:

- CNS : Depression
- Resp : Depression (rapid administration)
- CVS : Hypotension (large dosages)
- Nausea and vomiting
- Diplopia
- Thrombophlebitis
- Paradoxical excitation
- Physical and psychological dependence

INDICATIONS:

- Sedation
- Induction of anaesthesia
- Anticonvulsive therapy
- Muscle relaxant

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy to benzodiazepines
- In a patient with persistent convulsions, there are no other absolute contra-indications, but due to its ability to cause respiratory depression, it must not be used if the patient cannot be artificially ventilated should the need arise

PRECAUTIONS:

- Respiratory disorders:
 - COPD / asthma / hypoventilation
- Cardiovascular disorders:
 - Hypotension / hypovolaemia / congestive cardiac failure
- Psychosis:
 - No anti-psychotic effects
 - May increase agitation
- Active Labour:
 - Neonatal suppression
- Rule out all reversible causes of convulsions e.g. hypoglycaemia
- Elderly, debilitated and paediatric patients are more sensitive to the side effects
- Alcohol, barbiturates, narcotics and other depressants acting on the central nervous system may enhance/ alter the effects of midazolam

PACKAGING:

- 5mg/5ml ampoule
- 15mg/3ml ampoule
- 50mg/10ml ampoule

DOSAGE AND ADMINISTRATION:

Adults:

- Sedation
: 1mg/min slowly IVI
- Induction
: 5mg/min slowly IVI
- Repeat every 5 minutes
- Maximum
: 0.3mg/kg
- Titrate against effect
: use the minimum effective dosage
- Maintenance infusion : 0.03mg/kg/hr - 0.1mg/kg/hr when used in combination with narcotic analgesics
- Convulsions : 0.15mg/kg slowly IVI (maximum 0.3mg/kg)
- Rectally
: 0.3mg/kg (maximum 0.6mg/kg)
- Buccally
: 0.3mg/kg
- IMI
: 0.15mg/kg (maximum 0.3mg/kg)

Children:

- Sedation
: 0.05mg/kg slowly IVI
- Induction
: 0.15mg/kg slowly IVI
- Repeat every 5 minutes
- Maximum
: 0.15mg/kg
- Titrate against effect
: use the minimum effective dosage
- Maintenance infusion : 0.03mg/kg/hr - 0.1mg/kg/hr when used in combination with narcotic analgesics
- Convulsions
: 0.15mg/kg slowly IVI
- Rectally
: 0.3mg/kg
- Nasally/ buccally
: 0.3mg/kg
- IMI
: 0.15mg/kg

MORPHINE SULPHATE

DESCRIPTION:

- Classification : Narcotic analgesic
- Schedule : 7
- Antidote : Naloxone hydrochloride
- To be kept behind two locks
- Strict register to be maintained by individual paramedics
- Administration to be witnessed by at least one medically qualified person

PHARMACOLOGICAL ACTION:

- Morphine is a centrally acting analgesic that binds to specific opioid receptors in the brain and spinal cord, resulting in an increase of the pain threshold
- Reduced myocardial oxygen consumption and workload

PHARMACO-KINETICS:

- Half-life : 2 hours
- Onset of action : 2-3 minutes
- Peak effect : 20 minutes
- Duration of action : 4-6 hours

ADVERSE EFFECTS:

- Resp:
 - Depression
 - Bronchoconstriction
- CVS:
 - Flushing, sweating
 - Hypotension
 - Bradycardia
- CNS:
 - Convulsions
 - Depression
- GIT:
 - Nausea, vomiting
 - Dry mouth
 - Biliary spasm
- Other:
 - Miosis, blurred vision
 - Tolerance
 - Dependence
 - Urinary retention
 - Histamine release

INDICATIONS:

- Acute severe pain
- Cardiogenic pulmonary oedema
- Concomitant use with benzodiazepines for synergism in sedation

CONTRA-INDICATIONS:

- Known hypersensitivity/ allergies

PRECAUTIONS:

- CNS disorders:
 - Head injury, raised ICP
- CVS disorders:
 - Hypotension, hypovolaemia
- Resp disorders:
 - COPD, asthma
- GIT disorders:
 - Undiagnosed abdominal pain
- Children under the age of 1 year
- Elderly, debilitated patients
- The effects of opiates may be enhanced by alcohol, barbiturates, benzodiazepines, narcotics and other depressants acting on the central nervous system

PACKAGING:

- 10mg/1ml amber coloured ampoule
- 15mg/1ml amber coloured ampoule
- 20mg/1ml amber coloured ampoule

DOSAGE AND ADMINISTRATION:

Adults:

- Administer in increments of 1-3mg slowly IVI
- Repeat every 2 - 5 minutes
- Titrate against effect (use minimum effective dosage)
- Maximum 15mg

Children:

- 0.1mg/kg slowly IVI
- Repeat once, 5 minutes after initial administration
- Titrate against effect (use the minimum effective dosage)
- Maximum 0.2mg/kg

NALBUPHINE HYDROCHLORIDE

DESCRIPTION:

- Classification : Opioid analgesic
- Schedule : 5
- Antidote : Naloxone hydrochloride

PHARMACOLOGICAL ACTION:

- 50% analgesic effect of morphine
- Nalbuphine is a centrally acting analgesic that binds to specific opioid receptors in the brain, resulting in an increase of the pain threshold
- Opioid dualist (at higher dosages it has an additional antagonistic effect, limiting its agonistic action)
- Nalbuphine decreases the myocardial workload and oxygen consumption
- Nalbuphine has a low abuse potential

PHARMACO-KINETICS:

- Half-life : 5 hours
- Onset of action : 2-3 minutes
- Peak effect : 15-20 minutes
- Duration of action : 3-6 hours

ADVERSE EFFECTS:

- CNS : Depression
- CVS : Hypotension
- Resp : Depression
- Nausea and vomiting
- Dry mouth
- Sweating

INDICATIONS:

- Moderate to severe pain
- Acute myocardial infarction
- Obstetrical analgesic during labour
- Concomitant use with benzodiazepines for sedation purposes

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy

PRECAUTIONS:

- CNS disorders:
 - Head injury, raised ICP
- Cardiovascular disorders:
 - Hypotension, hypovolaemia
- Respiratory disorders:
 - COPD, asthma
- Gastro-intestinal disorders:
 - Intestinal obstruction
- Concomitant administration with alcohol, hypnotics and other CNS medication may exhibit an additive effect

PACKAGING:

- 20mg/2ml ampoule
- 20mg/1ml ampoule

DOSAGE AND ADMINISTRATION:

Adults:

- 2mg/min slowly IVI/IMI/SCI
- Titrate against effect (use the minimum effective dosage)
- Maximum 20mg (ceiling effect)

Children:

- 0.1 - 0.2mg/kg slowly (1mg/min) IVI/IMI/SCI
- Titrate against effect (use the minimum effective dosage)
- Maximum 0.2mg/kg

NALOXONE HYDROCHLORIDE

DESCRIPTION:

- Classification : Narcotic antagonist
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Naloxone competes with narcotic drug's opiate receptors in the central nervous system to displace the narcotic analgesics from their receptor sites. It will thus reverse the effects of narcotic analgesics such as respiratory depression, stupor, etc., but it also has the ability, because of its action, to cause acute withdrawal in a patient who is dependent on narcotics

PHARMACO-KINETICS:

- Half-life : 60 minutes
- Onset of action : 2 minutes
- Duration of action : 1-4 hours

ADVERSE EFFECTS:

- Acute withdrawal symptoms in opioid dependent patients
 - Sweating, piloerection, tremors
 - Agitation and convulsions
- Mydriasis
- Excessive lacrimation
- Nausea and vomiting
- CVS:
 - Ventricular tachycardia or fibrillation, hypotension or hypertension

INDICATIONS:

- Reversal of sedative effects and respiratory depression due to opiates
- Neonatal respiratory depression secondary to the administration of opioids to the mother
- Coma (non-traumatic)

CONTRA-INDICATIONS:

- Known hypersensitivity / allergy

PRECAUTIONS:

- Suspected narcotic dependence (may precipitate an acute withdrawal syndrome)
- The effect of naloxone is usually shorter than that of long acting narcotics and therefore repeated doses may have to be given in order to maintain the desired effect
- Provide adequate ventilation until respiratory depression has been adequately reversed

PACKAGING:

- 0.4mg/ml ampoule
- 0.02mg/ml (neonatal) ampoule

DOSAGE AND ADMINISTRATION:

Adults:

- 0.4mg slowly IVI/IMI/SCI
- 0.8mg ET
- Repeat every 2 - 5 minutes
- Maximum 10mg
- Should 2mg fail to elicit the desired response, then overdose with agents other than opioids should be considered

Children:

- 0.01-0.1mg/kg slowly IVI/IMI/SCI
- 0.02-0.2mg/kg ET
- Repeat every 2 - 5 minutes
- Maximum 2mg

NOTE:

- The therapeutic goal is to reverse any respiratory depression in a suspected narcotic overdose or coma of unknown origin, and not to fully awaken such patients, who may become violent should acute withdrawal occur

NITROUS OXIDE - ENTONOX

DESCRIPTION:

- Classification : Analgesic gas
- Schedule : 4

PHARMACOLOGICAL ACTION:

- Colourless, sweet-smelling, non-irritant gas
- Heavier than room air / oxygen
- Nitrous oxide has mild analgesic and anaesthetic effects depending on the dose inhaled
- When inhaled it depresses the central nervous system causing anaesthesia
- In addition, the high concentration of oxygen delivered along with the nitrous oxide increases oxygen tension in the blood, thereby reducing hypoxia
- It provides rapid, easily reversible relief of mild to moderate pain

PHARMACO-KINETICS:

- Extremely blood-insoluble
- Not metabolised by the body
- Eliminated via lungs (small amounts are eliminated through the skin)
- Onset of action: 30-60 seconds (maximum 3-4 minutes)

ADVERSE EFFECTS:

- Light-headedness
- Drowsiness
- Nausea and vomiting

INDICATIONS:

- Relief of pain from:
 - Acute myocardial infarction
 - Musculo-skeletal trauma
 - Burns - not including burns of the respiratory tract
 - Active labour
 - Any other condition requiring pain relief provided there are no contraindications present

CONTRA-INDICATIONS:

- Neurological impairment:
 - Any altered level of consciousness
 - Inability to comply with instructions or unable to comply with instructions
 - Head injuries
- Air entrapment:
 - COPD/asthma patient during an acute episode
 - Acute pulmonary oedema
 - Chest injuries
 - Abdominal trauma
 - Diving accidents (specifically Acute Decompression Illness)
 - Burns to the respiratory tract
- Other limitations:
 - Hypotension (SBP < 90 mmHg)
 - Major facial trauma (anatomic)

PRECAUTIONS:

- The constituent gases nitrous oxide and oxygen disassociate at < 4°C. It is imperative that the cylinder is inverted a few times and then placed horizontal when used in cold conditions as the patient will otherwise inhale pure nitrous oxide
- Nitrogen has decreased solubility in blood. Once in a gas-containing space the gas dissociates and nitrogen diffuses out slower than nitrous oxide diffuses in, and there is a net increase in gas volume
- When the mask is removed after prolonged use, the gas will come out of solution in the lungs and displace the oxygen in the alveoli, causing hypoxia
- In order to prevent this, the mask must not be strapped to the patient's face, and the patient must receive oxygen for ± 5-10 minutes, especially after prolonged use
- Nitrous oxide is a non-explosive gas

PACKAGING:

- Pressurised cylinders containing a mixture of 50% nitrous oxide and 50% Oxygen (N₂O+O₂: 50/50%)

DOSAGE AND ADMINISTRATION:

- Entonox is predominantly a self-administered gas
- The administration procedure is to be explained to the patient carefully before hand to prevent unnecessary complications
- Once the patient has inhaled enough entonox to control his / her pain they will remove the mask thereby preventing any chances of overdosing
- Registered paramedics are entitled to administer entonox to a patient, but this requires careful monitoring of the patient in order to prevent complications arising
- If the patient becomes drowsy, remove the Entonox and replace immediately with oxygen
- If in doubt as to the use of Entonox, call for assistance

SODIUM BICARBONATE 8.5%

DESCRIPTION:

- Classification : Electrolyte/ mineral
- Schedule : 1

PHARMACOLOGICAL ACTION:

- Sodium bicarbonate is an electrolyte solution intended for intravenous use for restoring the balance of the bicarbonate-carbonic acid systems

ADVERSE EFFECTS:

- Hyponatraemia
- Metabolic alkalosis
- Tissue necrosis and thrombophlebitis (if extravasation occurs)
- Hyperosmolarity
- Hypokalaemia
- Hypocalcaemia
- Intracranial haemorrhage (children)

INDICATIONS:

CLASS I : Definitely helpful

- Pre-existing hyperkalaemia

CLASS IIa : Acceptable and probably helpful

- Pre-existing metabolic acidosis e.g. Diabetic Keto-Acidosis, renal failure
- Tricyclic anti-depressant, aspirin overdose, stimulant abuse (e.g. cocaine)

CLASS IIb : Acceptable and possibly helpful

- Protracted cardiac arrest (where effective artificial ventilation and circulation have been established)
- Post-cardiac arrest (where spontaneous circulation has been established)

CLASS III : Not indicated and possibly harmful

- Respiratory acidosis
- Prolonged cardiopulmonary arrest without effective ventilatory and circulatory support

CONTRA-INDICATIONS:

- Respiratory acidosis
- Absence of effective ventilation and circulation

PRECAUTIONS:

- Never combine with calcium chloride in the same infusion and never administer via an infusion line containing calcium containing solutions (e.g. Ringers Lactate or Haemacell), unless the IV line is flushed with NaCl before and after administration (it may otherwise lead to precipitation)
- Never combine with catecholamines (e.g. epinephrine) in the same infusion (this may lead to inactivation)
- Never administer via the ET route
- A well-placed and free flowing IVI line is mandatory

PACKAGING:

- 20 ml ampoule of 8.5% solution (1.7g/ 20ml)
- 50 ml ampoule of 8.5% solution (4.25g/50ml)
- 100 ml vacolitre containing 50ml of an 8.5% solution

DOSAGE AND ADMINISTRATION:

- Initial : 1ml/kg (8.5%) slowly IVI with free flowing line
- Repeat : 0.5ml/kg (8.5%) slowly IVI every 10 minutes if required

TRAMADOL HYDROCHLORIDE

DESCRIPTION:

- Classification : Opioid analgesic
- Schedule : 5
- Antidote : Naloxone hydrochloride

PHARMACOLOGICAL ACTION:

- Tramadol is a centrally acting analgesic that binds to specific receptors:
 - Opioid receptors in the brain
 - Norepinephrine and Serotonin receptors
 - Synergism of above two receptors
- Resulting in an increase of the pain threshold

PHARMACO-KINETICS:

- Half-life : 5-7 hours
- Duration of action : 6-9 hours

ADVERSE EFFECTS:

- GIT
 - Nausea
 - Vomiting
 - Dry mouth
- CNS
 - Depression
 - Convulsions
- CVS
 - Bradycardia
 - Tachycardia
 - Hypotension
 - Flushing
 - Sweating
- Resp
 - Depression

INDICATIONS:

- Moderate to severe pain
- Concomitant use with benzodiazepines for sedation purposes

CONTRA-INDICATIONS:

- Known hypersensitivity to tramadol or other opioids

PRECAUTIONS:

- Rapid intravenous administration may be associated with a higher incidence of adverse effects and should therefore be avoided
- CNS disorders:
 - Head injury, raised ICP
 - Epileptic patients
- CVS disorders:
 - Hypotension, hypovolaemia
- Resp disorders:
 - COPD, asthma
- GIT disorders:
 - Intestinal obstruction

PACKAGING:

- 100mg/2ml ampoule

DOSAGE AND ADMINISTRATION:

Adults:

- Administer 100mg slowly IVI/IMI/SCI (1-2mg/kg)
- Repeat every 5 minutes
- Titrate against effect (use the minimum effective dose)
- Maximum 400mg
- The dosage should be adjusted to the intensity of pain and the individual's response

Children:

- Safety not established

ALS PRACTITIONER PROTOCOLS

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ALS PRACTITIONER PROTOCOLS

DECLARATION OF DEATH

Death may be declared to have occurred by a registered paramedic if:

A. The person is obviously dead due to / or evidenced by:

1. Decapitation or mortal disfigurement
2. Generalised charring due to extensive burns
3. Putrefaction
4. Post mortem lividity

OR

B.

1. There is no evidence of cardiac electrical activity on the Electrocardiogram in all 3 leads and
2. There are no palpable pulses and
3. There are no audible heart sounds and
4. Bilateral fixed and dilated pupils are present and
5. There has been no spontaneous breathing for the past 5 minutes and
6. There are no dolls eye movements present

Provided that:

The signs B 1 - 6 have been considered in terms of hypothermia, or possible drug effects.

If the above guidelines are adhered to, paramedics may declare death and hence further declaration by a medical practitioner would not be necessary before removing the patient from the scene.

COMMONLY ENCOUNTERED ABBREVIATIONS

No. ABBREVIATION MEANING

1. α Alpha
2. β Beta
3. μg / mcg Microgram
4. AMI Acute myocardial infarction
5. AV Atrio-ventricular
6. bpm Beats per minute
7. Ca^{2+} Calcium
8. CETZ Chemo-emetic triggerzone
9. CNS Central nervous system
10. COPD Chronic obstructive pulmonary disease
11. CPR Cardiopulmonary resuscitation
12. CVS Cardiovascular system
13. d Drops
14. ECG Electrocardiogram
15. ET Endotracheal administration
16. g Gram
17. GABA Gamma-aminobutyric acid
18. GIT Gastrointestinal tract
19. H_2O Water
20. HGT Haemo-glucose test
21. hr/s Hour/s
22. ICP Intracranial pressure
23. IMI Intramuscular injection
24. IOI Intraosseous injection
25. IOI =IVI Equivalent doses
26. IVI Intravenous injection
27. K^+ Potassium
28. kg Kilogram
29. max Maximum
30. mg Milligram
31. min Minimum
32. min Minute
33. ml Millilitre
34. Na^+ Sodium
35. NaCl Sodium chloride 0.9%
36. p.o. Per os
37. Resp Respiratory
38. SBP Systolic blood pressure
39. SCI Subcutaneous injection
40. UDV Unit dose vial

ALS PRACTITIONER PROTOCOLS

REFERENCES

1. South African Medicines Formulary
2. American Heart Association. 2000 Handbook of Emergency Cardiovascular Care
3. International Liaison Committee on Resuscitation Advisory Statements
4. The Merck Manual. 16th ed.
5. Countless scientific, peer reviewed and published journal articles
6. Manufacturer's Medication Package Inserts

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CAPABILITIES

These paramedic capabilities are as per the BLS and ILS Protocols and, in addition to the following, but not limited to, however, within the confines and constraints of the PBECP approved Critical Care Assistant and National Diploma EMC Curricula.

These capabilities are with reference to all emergencies falling within the scope of the profession of emergency care, and are applicable to patients of all ages.

No. CAPABILITY

- 1 ALS patient assessment, treatment, management and transportation
- 2 Oral endotracheal intubation
- 3 Nasal intubation
- 4 Blind nasal intubation
- 5 Double lumen airway
- 6 Retrograde intubation
- 7 Tactile intubation
- 8 Needle cricothyrotomy
- 9 Surgical cricothyrotomy
- 10 Bag-valve-tube- reservoir nebulization
- 11 Use of ventilators
- 12 Nasogastric intubation
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- 14 CPAP
- 15 PEEP
- 16 Defibrillation
- 17 Cardioversion
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- 19 Vagal manoeuvres
- 20 Crystalloids and colloids
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- 24 Intraosseous cannulation
- 25 Umbilical vein cannulation
- 26 Pressure infusion devices
- 27 Infusion pumps
- 28 Syringe pumps
- 29 Blood pressure monitors
- 30 Capnographs
- 31 Pulse oximeters
- 32 Care of CVP lines
- 33 Tourniquets
- 34 PASG - entire garment
- 35 Thoracentesis
- 36 Normal vaginal delivery
- 37 Mal-presentation management

- 38 Premature labour management
- 39 Obstructed labour management
- 40 Prolapsed cord management
- 41 Urinary catheterisation
- 42 Incubator transport and management
- 43 Drug administration as per medication schedules / standards / guidelines
- 44 Intravenous, intra-muscular, subcutaneous, endotracheal, intra-osseous routes of administration as per the standards and guidelines