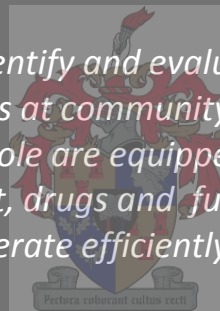


2012

Are we ready for an emergency?

A descriptive study to identify and evaluate whether the eight 24 hour emergency units at community health centres in the Western Cape Metropole are equipped with the essential emergency equipment, drugs and functional emergency trolleys to operate efficiently and safely



Dr K Adamson
October 2012



Declaration

I, **Dr Kaashiefah Adamson** the undersigned, hereby declare that the work contained in this assignment is my original work and that I have not previously submitted it, in its entirety or in part, at any university for a degree. I also declare that ethical approval for the study was obtained from the Health Research Ethics Committee of Stellenbosch University (Reference number: **N11/11/320**).

Signature: Dr Kaashiefah Adamson

Date: July 2013

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Abstract

Introduction

Trauma and emergencies contribute to the quadruple burden of disease in South Africa and being prepared for an emergency requires rapid access to emergency equipment, drugs and emergency trolleys to optimally manage an emergency. This is the first descriptive study looking specifically at essential emergency equipment, drugs and the emergency trolley required for the provision of optimal emergency care at Community Health Centres (CHCs) in the Western Cape Metropole.

Aims and Objectives

The aim of the study was to evaluate whether eight 24 hour emergency units at CHCs in the Western Cape Metropole had the appropriate and essential emergency equipment, drugs and emergency trolleys necessary for the delivery of optimal emergency care, using the Emergency Medicine Society of South Africa (EMSSA) guidelines as the audit tool.

Objectives included:

1. To assess availability of essential emergency equipment
2. To assess availability of essential emergency drugs
3. To assess the functionality of existing emergency trolleys

Methodology

EMSSA guidelines were used as the evaluation audit tool to perform a survey of emergency equipment, drugs and emergency trolleys at eight 24 hour CHCs in the Western Cape Metropole. Data collection for the study was conducted at the eight 24 hour CHCs over a 3 month period during the months of June 2012 to August 2012. The data was analyzed using the Statistical Package for Health Sciences (Statistica, version 10 of 2012) and Microsoft Excel.

Results

A total of 81 emergency equipment items, 43 emergency drug items (37 emergency drugs, 6 intravenous fluids) and 78 emergency trolley items were required to be in each emergency unit. An average of 62% of all recommended emergency equipment items, 80% of all emergency drugs and 52.4% of all emergency trolley items were found to be present in this survey. Essential emergency paediatric equipment including bag ventilation devices, Magill's

forceps, masks, intraosseous needles and appropriate blood pressure cuffs were found to be absent at 2 CHCs. All CHCs had access to a defibrillator and ECG machine but these were found to be dysfunctional at 2 CHCs due to expired batteries and no tracing paper being available. Expired first line emergency drugs (adrenaline and atropine) were found at certain CHCs. The recording of emergency trolley checklists and stocking of essential emergency items were found to be incongruent, inconsistent and not up to the recommended standard.

Conclusion

Essential emergency equipment and drugs and the functionality of emergency trolleys were found to be generally inadequate. Considerable deficiencies of essential emergency items were found, particularly paediatric equipment and drugs and this may negatively impact on resuscitative efforts and outcome in both paediatric and adult emergency care at CHCs in the Western Cape Metropole.

Introduction

An overview of Clinical Governance in Emergency Medicine in South Africa

Trauma and other emergencies remain a major contributor to the burden of disease in South Africa¹. Over recent years the focus on improving health systems and quality of care within emergency services has come to the forefront especially with the introduction of emergency medicine as a new specialty in South Africa. The need for national standards of care and accreditation within emergency medicine is pivotal if emergency medicine care is to be improved. The combined efforts of the Trauma Society of South Africa, Emergency Medicine Society of South Africa (EMSSA) and the Critical Care Society of South Africa are seeking to standardize guidelines addressing trauma and emergency care management within the context of South Africa. These guidelines would address aspects of structural, procedural, clinical and human resource allocation at various levels of emergency care in South Africa. At present the Resuscitation Council of South Africa in accordance with international guidelines regulates how cardiopulmonary resuscitation should be performed but there has been no effective attempt at the standardization of equipment, drugs and emergency trolley requirements in the emergency units of CHCs in the Western Cape.

Literature Review

Emergency Medicine Services in the Western Cape

Emergency Medicine Services (EMS) are managed through one body including three arms of services namely emergency operations, emergency support services and emergency medicine². A major challenge facing EMS in the Western Cape is the co-ordination of emergency services and centres across the platform of primary to tertiary care facilities. The Western Cape Provincial Department of Health has made co-ordination between health care facilities and EMS a priority in order to improve quality of care and patients experience of the service².

CHCs are 24 hour primary care facilities in the Western Cape. They are an integral part of trauma/emergency services and are usually the first access point to patients requiring basic emergency care. A previous study was conducted at four of 24 hour CHCs emergency units in the Western Cape Metropole with the purpose of providing insight into the workload, acuity and case mix, in order to provide for a model for care and resource allocation³.

Figure 1 illustrates that 30% to 45% of all cases were triaged as emergencies or urgent cases using the Cape Triage Score (CTS) and of these, 30% were trauma related, followed by adult and significant paediatric emergencies. Based on this study it was recommended that CHCs in the Western Cape be more geared towards emergency care with a focus on staff training and appropriate resource allocation, particularly regarding paediatric equipment.

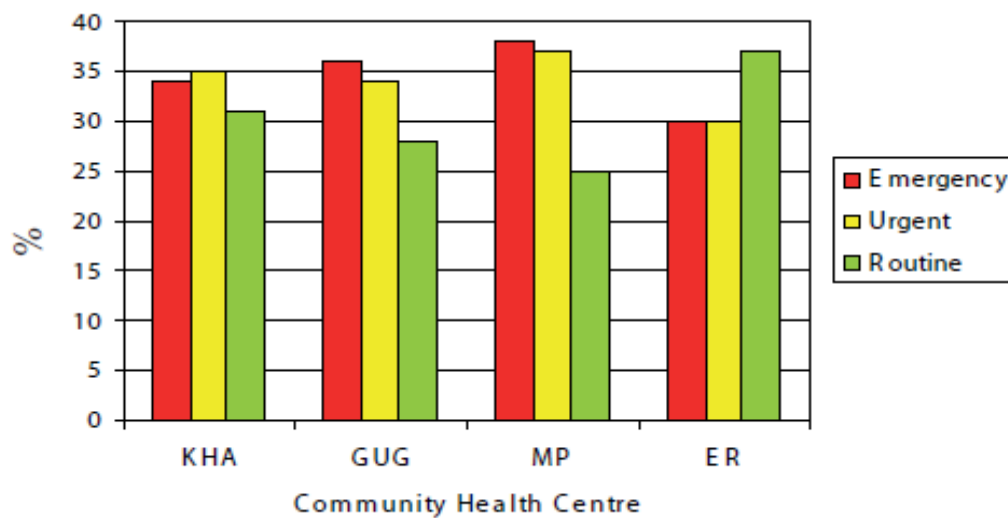


Figure 1: Degree of Urgency (CTS) at Khayelitsha CHC (KHA), Gugulethu CHC (GUG), Mitchell's Plain CHC (MP) and Elsies River CHC (ER) ³

According to CHPIP⁴, a South African child mortality and morbidity survey (2005-2009), 26% of cases came from primary health care centres. The survey attributed that the time spent in emergency units at primary health care centres was a crucial indicator of outcome during the management of paediatric emergencies. The modifiable factors cited included the (clinical) emergency assessment and factors related to the setting i.e. inadequate resuscitation and the emergency trolley. The study emphasized a vital need for early identification and prioritization of children seen at primary care centres as a means to reducing mortality and morbidity. This highlights the fact that primary health care facilities such as CHCs should not only be geared towards improving child health care but that there needs to be additional emphasis on management and readiness for paediatric emergencies.

Importance of Emergency Equipment, Drugs and the Emergency Trolley

EMSSA requires recommended minimum essential emergency equipment, drugs and components on the emergency trolley necessary for successful management of adult and paediatric resuscitations⁵. Delay in adequate response to an emergency or CPR (cardiopulmonary resuscitation) attempt has been attributed to broken, non-functional or non-availability of emergency equipment and the presence of expired emergency drugs, which may all in turn adversely affect the outcome⁶.

The Chain of Survival⁷ represents an integrated co-ordinated set of actions which if implemented efficiently could achieve a survival rate of 50% of witnessed cardiac arrests. Successful resuscitation depends upon timely access to appropriate equipment, the absence of which may lead to delay or failure in CPR⁶. Pulseless electrical activity accounts for 25% of all cardiac arrests witnessed in an in-hospital setting⁷. The victim's chance of survival decreases with an increasing interval between the arrest and defibrillation⁷. Defibrillation remains the cornerstone therapy for ventricular fibrillation (VF) and pulseless ventricular tachycardia (PVT) but in conjunction with good CPR increases probability of return of spontaneous circulation⁸. Thus early defibrillation is a crucial link in the survival chain following cardiopulmonary resuscitation. Survival diminishes by 7- 15% with every minute of delay in defibrillation⁹. Strategies should thus aggressively work towards reducing the interval between cardiac arrest and defibrillation. Checking of the defibrillator forms an essential part of the daily emergency trolley checklist¹⁰. This should include a documented representation of the functional status of the machine. A study conducted at CHCs in the Western Cape revealed that 52% of defibrillators were tested daily and of these only 26% were documented in a dedicated logbook¹¹.

It is important to have immediate access to ECG, blood pressure, pulse oximetry and glucose testing facilities¹². These monitors required during resuscitations are important to be able to assess resuscitation progress and outcome. Capnography can be a very useful tool in monitoring the effectiveness of resuscitation efforts⁷. This requires training in its use and interpretation. The efficacy of capnography at primary level care is yet to be researched.

The Essential Drug Programme (EDP)¹² was developed in keeping with the National Drug policy in order to provide accessibility to cost-effective evidence based medicines to all citizens. Few facilities have a full complement of essential drug list (EDL) drugs¹³. A drug registry is essential in order to keep stock of EDL drugs availability and usage.

Emergency Trolley

There are wide variations in emergency trolley items due to the lack of a standardized checklist of requirements¹⁴. A survey done of hospitals in the South West Thames region of England found a wide variation in emergency trolleys between different wards with the poorest availability in surgical, obstetric and geriatric wards;¹⁵ this finding related to mainly circulation equipment and emergency drugs. The emergency trolley can be organized into four parts including airway and circulation equipment, emergency drugs and other additional equipment¹⁶.

Emergency equipment and drugs found on emergency trolleys may vary depending on the clinical setting. Emergency trolley checklists should accompany the emergency trolley. EMSSA recommends regular checking on a daily basis or even more frequently depending on the clinical setting. Standardization of equipment, drugs and emergency trolley components has been shown to improve and aid familiarity¹⁷. Organized emergency trolleys provide structure, saves time and decreases confusion in an otherwise possible chaotic situation. Every effort should be made to be able to streamline restocking of used or missing items required on the emergency trolley¹⁸. A minimum of one emergency trolley should be found within a given clinical work domain at a known, easily accessible site. Health professionals should be familiar with the equipment and drugs on the emergency trolley, the time to administration of emergency drugs, the prevention of un-locatable equipment, unnecessary drawer opening and overall team performance during the resuscitation attempt¹⁷.

Emergency Preparedness

An institution's ability to handle an emergency is proportional to the hazard faced by the population multiplied by its vulnerability divided by the level of preparedness¹⁹. Preparedness according to the WHO requires that plans be developed, personnel at all levels and in all sectors be trained, and communities at risk are educated, and that these measures are monitored and evaluated regularly¹⁹. Emergency preparedness depends on five factors¹⁸ when assessing an institution's ability to handle an emergency i.e. 1) risk and needs assessment 2) establishing written policies 3) selecting institution appropriate equipment and supplies 4) education of staff 5) maintaining a state of preparedness.

In order for an institution to provide a medical service to the population, there is a need to understand the population or communities they are serving. This service needs to be adapted to the specific burden of disease within that community. The Western Cape has a quadruple burden of disease² and these manifest in the type of cases seen in emergency units at CHCs. A special focus should be on emergencies relating to trauma and violence, chronic diseases, maternal and child health. Thereafter it is important to develop an emergency response plan in the form of policies or protocols¹⁸. These include factors relating to resources and clinical emergency care governance. It is important that selection and standardization of emergency equipment, drugs and supplies are appropriate to the clinical setting while making sure that health professionals are trained in their use. The final step is ensuring that each institution maintains a state of readiness by putting mechanisms into place to be able to handle emergencies at any given time.

Problem Statement

CHCs in the Western Cape are the first point of entry for emergency care services. More than half of emergency services case acuity consists of patients requiring immediate or urgent care, with a significant number of paediatric cases. In order to improve resuscitation outcomes an effective resuscitation response or strategy is needed and this includes the availability of appropriate resources for services to function effectively. There are no standardized checklists for emergency equipment, drugs and emergency trolleys that ensure overall uniformity at CHCs. Guidelines developed by EMSSA were used in this study to evaluate emergency equipment, drugs and emergency trolley components at CHCs in the Western Cape.

Aim

1. To evaluate whether eight 24 hour emergency units at CHCs in the Western Cape are equipped with the essential emergency equipment, drugs and functionality of the emergency trolley (with use of Emergency Medicine Society of South Africa guidelines)
2. To improve the quality of care provided at emergency units in CHCs

Objectives

4. To assess availability of essential emergency equipment
5. To assess availability of essential emergency drugs
6. To assess the functionality of existing emergency trolley

Research Methods and Design

Ethics Statement

Ethical approval for the study was obtained from the Health Research Ethics Committee of the University of Stellenbosch and permission to conduct the study was obtained through the local District Health authorities.

The study could possibly expose issues relating to resource distribution and management. It could question cost effectiveness and how it affects delivering an equitable and fair service. All members of a community should have equal access to basic emergency health care, especially minority/marginalized groups (e.g. children, women, and the poor) and institutions that lack essential emergency supplies may not be providing safe and accessible emergency care. This might impede their ability to be non-maleficent. Patients accessing public health care may not have the “autonomy” to decide which emergency centre to access. They are forced to follow the “level of care” rule of access which leaves CHCs as the first point of access to most patients. This study may shed light on the need to initiate policy changes and regular clinical audits in order to improve emergency service delivery.

Study Design

A quantitative, descriptive research design was used for this study to investigate emergency equipment, essential drugs and emergency trolleys at the eight 24 hour CHC emergency units in the Western Cape Metropole. Emergency Medicine Society of South Africa (EMSSA) guidelines were used as the audit tool to describe emergency equipment, drugs and the emergency trolley available. The EMSSA guideline is the only tool from the emergency medicine governing bodies that provides a standardized checklist to evaluate emergency equipment, drugs and the emergency trolley in South Africa.

The EMSSA guideline: required emergency equipment and emergency drugs and intravenous fluids required on an emergency trolley (see appendix for full EMSSA guidelines)

Devices to open and protect the airway

- Laryngoscope set :handle with adult & paediatric blades, spare bulbs & spare batteries
- Tracheal tubes :un-cuffed (sizes 2.5 – 5.5mm) cuffed (sizes 3.0 - 8.5mm)
- Water-soluble lubricant / KY jelly
- 10 ml syringe
- Tape or equivalent to tie tube in place
- Oropharyngeal airways sizes 000 - 5
- Nasopharyngeal airways sizes 3 – 7

Devices to confirm tracheal intubation

- Oesophageal detector device
- End tidal CO₂ monitoring, including single use of colorimetric devices

Equipment for difficult intubation

- Introducers for ET tubes (adult & paediatric) stylets
- Magill's forceps (adult & paediatric)
- Laryngeal masks (sizes 1 – 5)
- Gum elastic bougie (adult & paediatric)

Devices to deliver oxygen and ventilate patients

- Bag valve ventilation devices with oxygen reservoir
- Adult, paediatric & neonatal masks
- Oxygen delivery devices (simple face masks, partial re-breathing masks, nebulizer masks, nasal prongs and T-piece)
- Oxygen supply with flow regulator and oxygen tubing

Equipment to diagnose and treat cardiac arrhythmias

- ECG monitor defibrillator (with conductive paste or pads, paddles, electrodes & razor)
- Cardiac arrest board

Devices to gain vascular access

- I.V. cannulae (14-24G and appropriate strapping)
-

-
- Needles and syringes (1-50ml)
 - Sharps container
 - Adult & Paediatric intraosseous needles or bone marrow needles
 - I.V administration sets including blood administration sets, high flow sets and buretrol

Equipment for monitoring airway, breathing and circulation

- Stethoscope
- Pulse oximeter with adult & paediatric probes
- Non invasive blood pressure monitoring device including paediatric & large adult cuff sizes
- Thermometer including low reading capability
- Blood glucose testing
- Collection tubes for investigations
- Appropriate hardware, tubes and catheters

Essential Emergency Drugs and intravenous solutions

- Adrenaline
 - Amiodarone
 - Antibiotics (range depends on local circumstances)
 - Antihistamine (e.g. promethazine)
 - Aspirin
 - Atropine
 - Beta stimulant nebulisation (e.g. salbutamol) and inhaler with spacer
 - Calcium chloride 10%
 - Dextrose 50% IV
 - Furosemide
 - Glucagon
 - Hydrocortisone
 - Insulin
 - Ipratropium nebulisation and inhaler with spacer
 - Lignocaine IV
-

-
- Magnesium
 - Medical oxygen
 - Potassium chloride
 - Naloxone
 - Sodium bicarbonate 8.5%
 - Thiamine
 - Ringers lactate or equivalent balanced salt solution
 - 0.9% NaCl
 - 10% Dextrose
 - Appropriate paediatric solutions (e.g. half dextrose darrows, neonatalyte)
-

Setting

The study was carried out at the eight 24 hour CHCs in the Western Cape Metropole. They are all located within the urbanized Cape Town Metropole and provide health services to approximately 66% of the Western Cape's population. The Cape Town Metropole district is divided into four sub-districts. Allocation of resources is based on the total population per sub-district. Each clinic is attached to a community health centre (CHC) which is linked to the drainage area district hospital and tertiary hospital. Each CHC serves a population ranging between +/- 30,000 to 120,000. CHCs represent the entry point for emergency services within the District Health System of the Western Cape Metropole. These CHCs are situated mostly in residential areas and provide a range of chronic, curative and emergency care services to demarcated population with geographical boundaries. At present there are different health authorities managing smaller peripheral/ mobile clinics, CHCs and midwifery services. CHCs are staffed by family physicians, medical officers, nurses, pharmacists and allied health sciences. Emergency medicine is managed through a single EMS authority in the Western Cape but the difficulty lies in managing services across the levels of primary to tertiary care.

24 Hour Community Health Centres	Abbreviation
Delft Community health Centre	DCHC
Elsies River Community Health Centre	ERCHC
Gugulethu Community Health Centre	GCHC
Hanover Park Community Health Centre	HPCHC KCHC
Kraaifontein Community Health Centre	VCHC MPCHC
Vanguard Community Health Centre	
Mitchell's Plain Community Health Centre	RCHC
Retreat Community Health Centre	

Table 1: 24 Hour Community Health Centres situated in Western Cape Metropole

Sampling and Data Collection

The study did not require any study population calculations or sampling procedures. It required that I obtained experience in being able to perform a quality and functionality check on equipment, drugs and the emergency trolley requirements. I attended ATLS and ACLS workshops to be able to acquaint myself with the different types of equipment, drugs, monitors and machines I might encounter.

Inclusion Criteria	Exclusion Criteria
Eight CHC (24 hour facility)	Level 1 hospital – Tertiary ED centers
Emergency equipment/ trolley	Chronic diseases equipment
Emergency drugs	Chronic diseases drugs

Table 2: Inclusion and Exclusion Criteria

Data collection from the study was conducted at the 8 CHCs over a 3 month period during June 2012 to August 2012. The EMSSA guideline was used as the audit tool because it is the only checklist available from a recognized Emergency Medicine authority in South Africa.

In order to minimize bias, one researcher independently visited the CHCs auditing equipment, drugs and the emergency trolley. It took approximately 8 months to obtain

permission to conduct my research through the local district health authorities. Once permission was obtained, each facility was contacted the week prior to my visit scheduling an appointment with the emergency unit operating manager at each facility. The study was conducted with the help of the trauma unit operating manager. The purpose of the study was explained and each visit took about 2 to 3 hours, checking and ascertaining whether the equipment and drugs were available and not expired. All the equipment, monitors and machines as stipulated on the EMSSA guideline were checked, including the emergency drugs present in the emergency unit, on the trolley or in the fridge. The interaction with the trauma unit operating manager highlighted many deficiencies with regards to operational difficulties.

Analysis

The data was analyzed by using Statistical Package for Health Sciences (Statistica, version 10 of 2012.). Microsoft Excel was used to generate figures and graphs.

Results

The availability of Essential Emergency Equipment at community health centres

According to the EMSSA guidelines a total of 81 emergency equipment items were needed in each emergency unit. On average the emergency units had 62% of all equipment needed at the time the study was being conducted. The CHC with the lowest percentage of items at 60% was Hanover Park CHC. The items were either missing or defective. Figure 2 illustrates the distribution of emergency equipment across emergency units at CHCs.

When assessing the items in the devices to open and protect the airway, all CHCs were found to have a laryngoscope handle and adult blade. There was no paediatric blade at two CHCs. Spare bulbs and batteries were missing at all CHCs except MPCHC and RCHC. The number of various sized tracheal tubes was sufficient. Other adjuncts found to be absent included meconim aspirators, nasopharyngeal airways, tracheotomy tubes and devices to confirm endotracheal tube placement.

The equipment for managing difficult airways was scanty. Adult introducers and Magill's forceps were found at all CHCs. Paediatric introducers and Magill's forceps were not found at 5 CHCs. Laryngeal airway masks were found at only 2 CHCs but not all appropriate sizes were present. Elastic gum bougies were not found at any of the CHCs.

At two CHCs there were no paediatric or neonatal bag ventilation devices. At 4 CHCs there were no appropriate paediatric masks. Partial rebreather masks and T- pieces were also absent. All CHC's had access to either cylinder or wall oxygen with tubing. HCHC and RCHC had no portable ventilator with PEEP valve.

CHCs had access to a defibrillator but those at ERCHC and HCHC were found to be non functional because of no paper and expired batteries.. At both of these two CHCs 12 lead ECG machines were found to be defective. All CHCs had no transcutaneous pacing facilities.

There was an overall lack of paediatric intraosseous needles and CVP (central venous pressure) lines. Fluid warmers were present at KFCHC and GCHC. Emergency Blood (unexpired) was available at all CHCs.

Automated blood pressure devices were found at all CHCs but there were no battery backups. There were no appropriately sized paediatric blood pressure cuffs at 7 CHCs. Suction devices were defective at 3 CHCs because they were unable to generate adequate suction or there was no tubing available. At 5 CHCs there was no maternal delivery pack present in the emergency department or Doppler devices for foetal heart rate monitoring. Fixation and limb traction devices were not present. Functional autoclaves were present at all CHCs. Nasogastric tubes and urinary catheters were present but there were no drainage bags in stock.

Resuscitation guidelines were found on all walls in each CHC but they were found to be not up to date. Documentation record of resuscitations performed was not found at any of the CHCs.

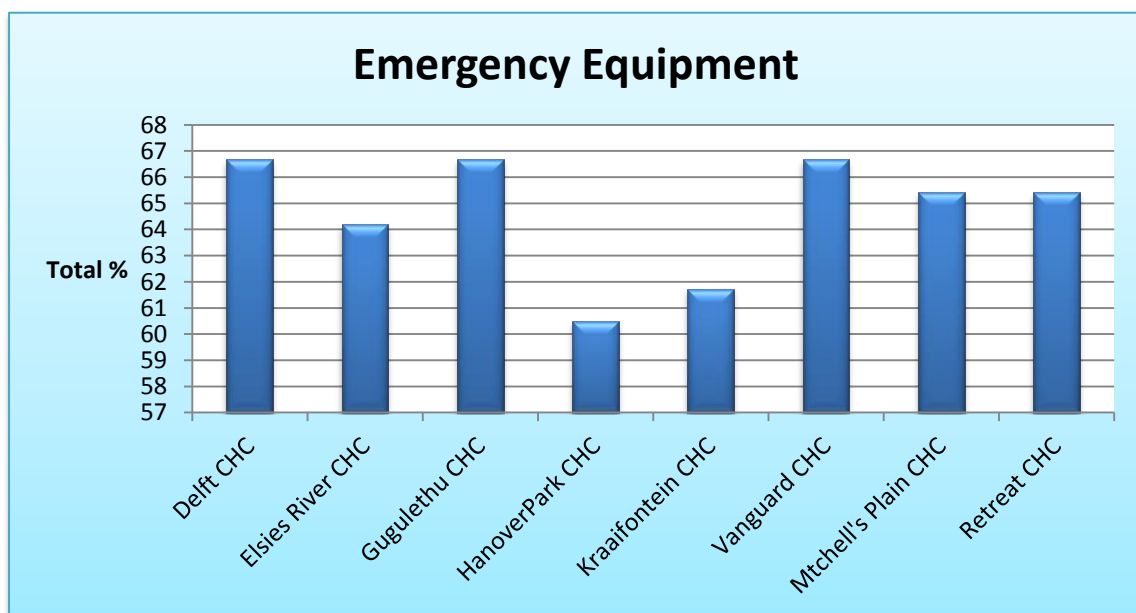


Figure 2: Distribution of Emergency Equipment in Community Health Centres in Western Cape Metropole

The availability of essential Emergency Drugs and Intravenous Fluids at community health centres

A total of 43 items of emergency drugs and 6 intravenous fluids were needed in each emergency unit. Averages of 80% of all emergency drugs were present at the time of the study. Most crystalloid intravenous fluids were present but 10% dextrose was generally out of stock. Figure 3 illustrates the distribution of emergency drugs and intravenous fluids across emergency units at CHCs.

Immediate emergency resuscitation drugs, including adrenaline, atropine and succinylcholine, were present but at DCHC the adrenaline and atropine had expired by a few months. Certain drugs were not part of the package of care for CHC use but formed part of the EMSSA emergency drug checklist. Emergency drugs that were absent at certain CHCs included adenosine, amiodarone, digoxin, clopidogrel and thiopentone. Intravenous lignocaine was not available in 3 CHCs, although this drug is currently rarely used in emergency centres.

Asprin and sublingual nitrates were not found in two emergency unit CHCs but all had fibrinolytics (streptokinase) present in the fridges. Glucagon was not present at five CHCs, but insulin was available. Salbutamol for nebulization was found at all CHCs, but ipratropium bromide was absent at 4 centres. Other emergency drugs not present at one CHC included antihistamines, diazepam, midazolam, furosemide, potassium chloride, sodium bicarbonate (8, 5%), morphine and a post exposure prophylaxis pack (HIV).

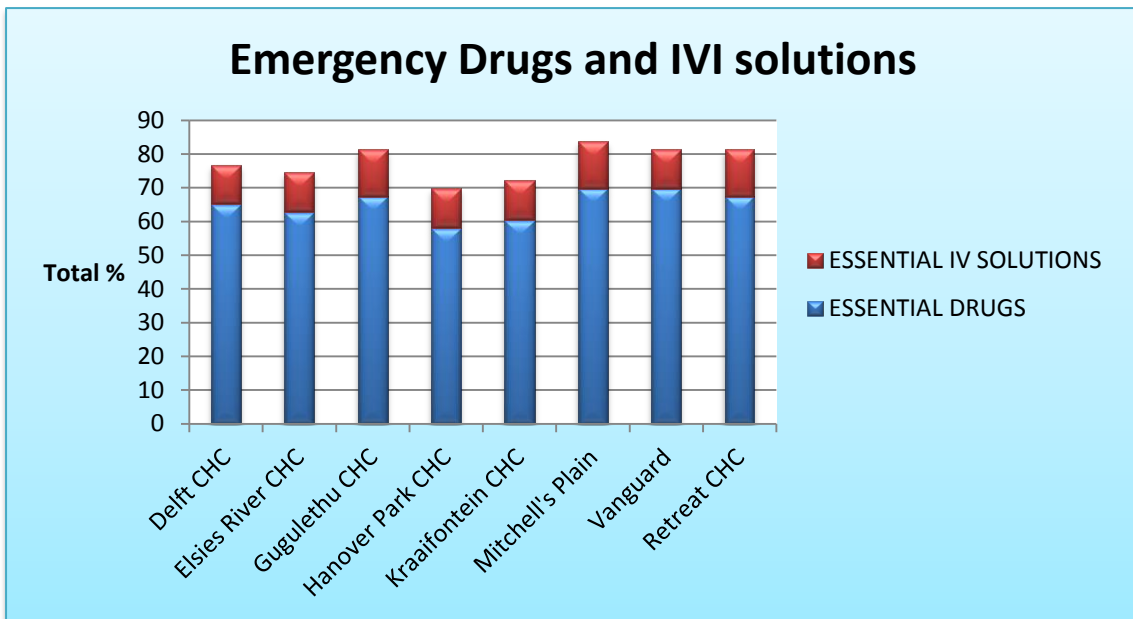


Figure 3: Distribution of Emergency Drugs and Intravenous Fluids at Community Health Centres in Western Cape Metropole

The functionality of Emergency Trolleys at community health centres

A total of 78 items are required to be on the Emergency Trolley of which 53 are equipment items, 21 are specific emergency drugs and 4 types of intravenous fluids. An average of 52.4% of all items was found on emergency trolleys at CHCs. Separate paediatric boxes or emergency trolleys were found at HCHC, KCHC and MPCHC. Figure 4 illustrates the functionality of emergency trolleys at emergency units at CHCs.

The EMSSA guideline included completion of an emergency trolley checklist. Checklists indicated that during the previous week a daily check had been performed at all CHCs, but at 5 CHCs these had not been done over the previous weekend. The checklist included a defibrillator check but there was no indication that this had been done at 4 of the CHCs. There was a designated defibrillator checklist book with print outs a defibrillator check at only 2 CHCs.

Paediatric airway (difficult) equipment was lacking. This was particularly evident at HCHC. Paediatric tracheal tube sizes although present in emergency equipment stock were found to be absent on 25 % of emergency trolleys. Oxygen delivery devices such as rebreather masks, nebulizer masks, nasal prongs and T-pieces were found to absent on 75% of emergency trolleys. All trolleys had portable oxygen cylinders but at KCHC the cylinder was empty. Intercostal drain sets were not present on 3 emergency trolleys. Intravenous lines were not found on two trolleys at HCHC and VCHC. Suction devices were defective on 3 emergency trolleys (ERCHC, HCHC, and VCHC). HCHC was the only emergency centre to not have a functional defibrillator.

Adrenaline and atropine were found to be expired by some months on the DCHC emergency trolley. Aspirin was not found on 50% of emergency trolleys. 37% of the emergency trolleys had no intravenous lignocaine, calcium chloride (10%) and potassium chloride. Other items not present at one particular CHC included hydrocortisone, sodium bicarbonate and an antihistamine. There were no antibiotics or 10% dextrose present on all emergency trolleys.

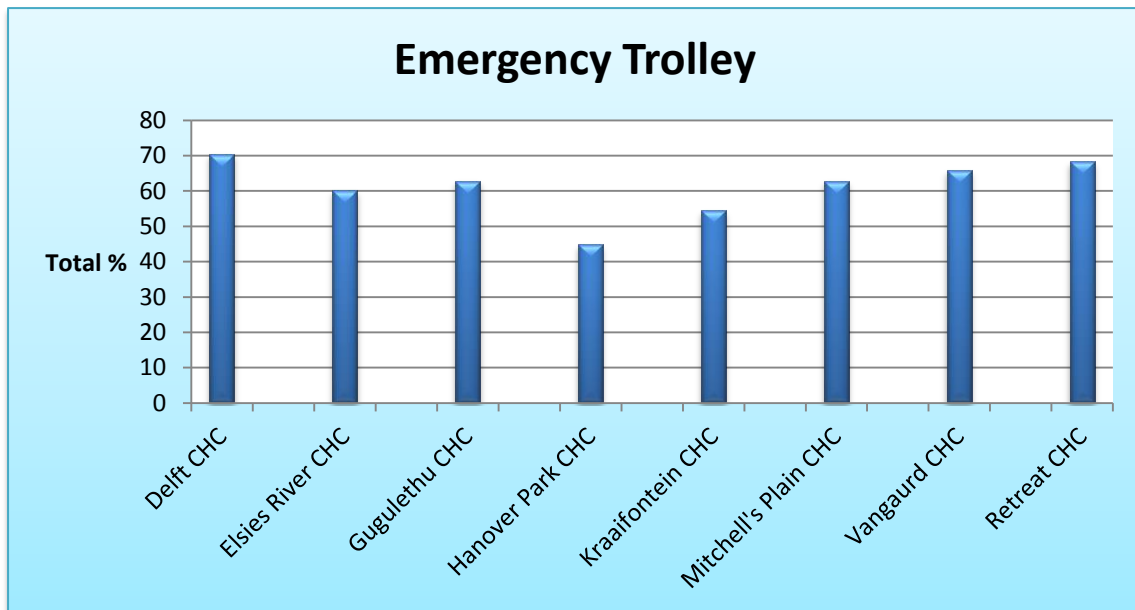


Figure 4: Functional status of Emergency Trolleys at Community Health Centres in Western Cape Metropole

Discussion

Key Findings and comparison to literature

To our knowledge this was the first study aimed at describing emergency equipment, drugs and the emergency trolleys at CHCs within the Western Cape Metropole. With trauma and violence contributing to quadruple burden of disease² within the Western Cape, it is important that CHCs be adequately prepared for managing emergencies.

Studies have shown that very often emergency equipment and drugs are not readily available during emergency management and resuscitations²¹. This study has further highlighted this common theme and has emphasized the great need for standardized essential emergency equipment and supplies across primary level care. Due to the lack of certain emergency equipment, drugs and functional emergency trolleys at some CHCs it was questionable whether they could optimally manage patients during emergencies. Emergency supplies were either missing or defective at many CHCs. In the event of equipment failure no backups were in place to manage emergencies effectively and this could have serious consequences on resuscitation outcome. However this situation is not exclusive to CHCs in Western Cape Metropole. A survey conducted by The Pennsylvania Patient Safety Authority¹⁸ indicated common issues relating to emergency equipment availability, including missing items, incorrect equipment sizes, empty oxygen tanks, drained batteries, un-stocked or unlocked emergency trolleys and failure to identify expired items. This survey highlights the lack of standardization of emergency items and designated responsibility towards delivery, maintenance and refurbishment after use. In addition it emphasized how crucial it is for managing bodies to decide on the level of care necessary for a particular practice and to have an appropriate written plan¹⁸ for the checking and provision of emergency equipment and drugs.

Emergency units at CHCs provide a significant paediatric emergency³ service and any delay may lead to considerable morbidity and mortality. Essential paediatric equipment including bag mask ventilation devices, Magill's forceps, masks, intraosseous needles and appropriate blood pressure cuffs, were found to be absent at many CHCs. Some paediatric emergency boxes were found to be inadequately stocked. Specifically designed paediatric emergency trolleys have been shown to optimize the outcome of paediatric resuscitation. Colour coding

has also been associated with a significant reduction in errors in emergency drugs dosages and equipment use.

Difficult intubation is an unpredictable event that requires health professionals involved in resuscitations to anticipate and be prepared for when it does arise. Emergency trolleys should also be equipped with appropriate equipment. There is no consensus about equipment for managing a difficult airway²² in primary health care and various problems with equipment were found to be present at CHCs. It is evident from the data described that checking of defibrillators, monitors and suction devices still remains a major problem.

The efficacy of emergency drugs declines beyond the expired date²⁰ which could render optimal management of emergencies to be inadequate. Primary emergency drugs such as adrenaline and atropine were found to be expired at some centres. In addition to checking the availability of emergency drugs, expiry date checks should be included. Not all emergency drugs as indicated by the EMSSA checklists were found to be present at some CHCs. This could possibly be due the acuity and type of emergency presentations at CHCs.

Emergency trolley checklists should accompany the emergency trolley²³. EMSSA recommends regular checking on a daily basis or even more than that depending on the clinical setting. The eight 24 hour CHCs all had different checklists. The recording of emergency trolley checklists and stocking of essential equipment and drugs were found to be incongruent and inconsistent. There was no indication as to whether restocking or refurbishment of essential items had been done and how this related to the exact usage of the emergency trolley at the time of need. Defibrillator checks is an essential part of the daily check and should be clearly documented. Emergency trolleys were also not uniform at the different CHCs. A minimum of one emergency trolley should be found within a given clinical work area, with the site being well designated and easily accessible¹⁸. At CHCs where resuscitation areas were not well demarcated, emergency trolleys were unfortunately also often obscured. At CHCs paediatric/neonatal emergency items were kept separately but there was a definitive lack of the preparedness required for paediatric emergencies. Innovations into increasing familiarity with emergency trolley contents have been shown to improve resuscitation outcome²⁴ but this is not a reality within the resource constrained South African Public Health sector.

This study raises important questions regarding training of checking emergency supplies, especially the emergency trolley. It also questions the knowledge of health professionals in terms of their understanding of the contents of emergency trolleys and the importance of maintaining a state of readiness in an emergency unit. Furthermore it raises questions around the “supply chain” from checking to restocking and refurbishment of supplies and the processes that should be in place for timeous replenishing of supplies. Accountability for checking, ordering and replenishing of supplies is another issue that needs to be addressed, including how to streamline communication and to avoid possible logistical issue problems.

Regular clinical audits are required, ensuring correct checking, replacing and repairing of defective items. These audits would serve as a tool to improve resource allocation and optimize emergency health outcomes. Recording of resuscitation events and regular morbidity and mortality meetings are recommended. This should be an essential part of protocol at all CHCs. Emergency units at CHCs usually have paper based medical records¹⁸ which makes it difficult for adequate interpretation of data and analysis.

The quality of emergency services in South Africa has been ignored for decades and only recently through the efforts of EMSSA, the Trauma Society of SA and the Resuscitation Council of South Africa has there been an emphasis on improving emergency services in the public health sector. Studies assessing structural performance indicators¹⁸ provide a good baseline and insight into the current situation within our emergency units. The enormous task that lies ahead is whether we are able to translate this into improved clinical outcomes. This major challenge depends on whether there is commitment to quality improvement through effective clinical governance which involves a multidisciplinary team.

Limitations and implications

The study was conducted only at CHCs within the urban Western Cape Metropole. Rural CHCs and primary health care clinics were not included in the study. The study described emergency supplies within a single snapshot of time. Many confounding factors could be attributed to the results described for example the pre or post resuscitation meetings, including addressing the issue of previously ordered stock having arrived and stock ordered but not having arrived. Results from study will give an indication of the struggles facing

emergency care with CHCs but cannot be generalized across primary healthcare facilities across the Western Cape. The quality of this study was heavily dependent on my own knowledge and skills with regards to checking and testing of emergency equipment, drugs and the emergency trolley. I made every effort to familiarize and train myself to be able to conduct this study. Although this might be seen as a limitation, it gave me an in depth understanding of the issues facing emergency units at CHCs. If this study is a reflection of the standard availability of emergency equipment, drugs and emergency trolleys within our CHCs, there is reason for great concern regarding the quality of emergency care at the primary care facilities in the Western Cape. Further research within CHCs emergency services is indicated i.e. a future quality assurance clinical audit after certain improvements are made by the CHCs. Improvements could be made and facilitated by having focus group meetings with facility managers and other health professionals at the CHCs, including revision of emergency care protocols and guidelines.

Recommendations

- Development of a standardized checklist (clinical setting appropriate) and minimizing the complexity of essential emergency supplies
- Checks should include regular documented drug expiry date checks
- Attention paid to appropriate size of equipment (paediatric emergency care emphasis)
- Checking of defibrillator and documenting in a separate dedicated logbook.
- Checking of suction devices and oxygen supplies and adjuncts.
- Need for training with regards to emergency trolley checking
- Regular clinical audits of emergency equipment, drugs and emergency trolleys and recording of outcome with a plan of intervention
- Development of written plan with regards to checking, restocking, refurbishment and maintenance of emergency supplies
- Rapid response preparedness (maintenance) should be a priority
- Resuscitation morbidity and mortality meetings in order to identify issues and outcomes surrounding resuscitation attempts within emergency units
- Accountability within clinical governance for the rendering of emergency services

Conclusions

In the eight participating 24 hour CHCs in the Western Cape Metropole, the availability of essential emergency equipment and drugs and the functionality of emergency trolleys were found to be generally inadequate. There were considerable deficiencies of essential emergency items particularly in the paediatric domain, and this may negatively impact on resuscitative efforts at all levels within emergency units at CHCs in the region. Failure to adequately check, restock, refurbish and maintain emergency items and drugs on a regular basis may result in subsequent unpreparedness of healthcare staff, resulting in suboptimal outcomes in the management of emergencies in the Western Cape Metropole.

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Appendix



Figure 5: Unrecognizable emergency trolley found hidden under a green cloth at HPCHC



Figure 6 Disorganized paediatrics emergency box at HPCHC



Figure 7: Emergency Trolley at ERCHC