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An Analysis of the Clinical Practice of Emergency Medicine in Emergency Centres in the Western Cape

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SUBMITTED TO THE UNIVERSITY OF CAPE TOWN

In partial fulfilment of the requirements for the degree

MMed Emergency Medicine

Faculty of Health Sciences

UNIVERSITY OF CAPE TOWN

Date of submission: March 2010

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DECLARATION

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ABSTRACT

Objectives

To determine whether the current South African Emergency Medicine Curriculum is appropriate for the burden of disease seen by registrars in Cape Town Emergency Centres.

Method

This is a cross-sectional retrospective audit of patients presenting presenting to a range of secondary level Emergency Centres in Cape Town. The type of clinical presentations, investigations done and procedures performed were analysed. Basic descriptive statistics are presented.

Results

A total of 1283 clinical presentations from three secondary level ECs in Cape Town were collated. Of these clinical presentations, 47 were not included in the South African Emergency Medicine curriculum; in addition, 2 were only included in the paediatrics section. 115 procedures were tabled, of these, 11 were not included in the curriculum. 730 investigations were tabled; 527 were not included in the curriculum.

Conclusions

The curriculum did not cover all the clinical conditions, procedures and investigations encountered by EM registrars in Cape Town. In addition, there were multiple categories in the curriculum that were not encountered in EM practice at all. The investigations section of the curriculum correlated particluarly poorly with the skills needed for the burden of disease seen in ECs in Cape Town. The curriculum should be redrafted guided by a practice analysis of EM.

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INTRODUCTION

Emergency Medicine (EM) is a new specialty in South Africa and, as such, the scope of practice is still being defined in our context. [1,2] The scope, frequency and acuity of presenting complaints and diagnoses seen in Emergency Centres (ECs) in South Africa should be used to guide curriculum development, training and assessment of EM trainees. Better understanding of the patients seen in our ECs would provide a foundation to develop the existing core curriculum for EM training in South Africa. [3] It would help to ensure that locally produced specialists are appropriately trained for the patients which they will see in their ECs.

EM became a registered specialty in South Africa in 2003. [1,2] As with any new discipline, there are challenges in defining the speciality and establishing its scope, which in the case of EM is multidisciplinary, and the backbone is concerned with "resuscitation, stabilisation and appropriate disposition" of patients. [1] The profile is different from those of first world countries in case mix, but also has different challenges in terms of difficult work environments. EM is on the forefront of the point of entry of patients to the hospital, and thus a broader knowledge of medicine, including rare conditions, is desirable for the Emergency Physician, as they are the initial diagnosticians. There is however a limitation as to the knowledge one can impart within a registrar rotation, and considering the vast scope of presentations , the core curriculum should be clearly defined. It is also desirable that a prgramme in South Africa adequately prepare registrars to work in multiple different environments, such as the private sector in RSA, other African countries and first world environments. South Africa, with it's mixed first and third world populations and the conditions asscociated with these, is well placed as training for both environments. Given the resource limitations in our system, it is important to be mindful of best practice in the international sense, and this knowledge – both as academic knowledge and skills - should be included in the curriculum.

One of the first steps in establishing a new speciality is defining the core curriculum against which specialists will train. The South African EM curriculum [3] was drafted prior to commencement of the EM training programme, and was based on international curricula. Despite the fact that the

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curriculum is intended only as a guide, it is essential that it is relevant to the workload actually experienced on a daily basis in ECs by EM trainees. As a new specialty, a curriculum and scope of practice defined specifically for the conditions in this country is needed. While a curriculum for EM can be guided by those already established (such as those in the USA, UK and Australia) [4,5,6], these do not necessarily apply to South Africa. A locally produced curriculum is essential.

South Africa is a varied country of 49 million people (Census Estimate Mid-Year 2009) [7] this population may have varying health needs according to the province in which they live. It has first and third world populations, and patients present with the diseases that occur in very different socio-economic groups. There is very limited research looking at casemix in ECs in this setting. [9,10,11] Most research looking at burden of disease is derived from mortality figures and as such does not include those diseases contributing to morbidity. [11,12,13] In addition, these figures usually reflect the population seen by all medical specialities and not specifically EM. A more accurate assessment of the workload, casemix and acuity level of presentations at ECs will be useful not only in terms of defining the scope of training for EM doctors, but also to guide health system priorities.

Specifically, the following health system priorities could be guided by this information:

1. Primary prevention

   An analysis of the frequency of presentation of complications of chronic conditions such as diabetes, tuberculosis or hypertension is a good indication of the quality of primary health care received by patients. This knowledge could be used to audit existing primary health care programmes and drive improvements.

2. Service delivery

   The information derived from a study looking at case-mix in the local setting would give valuable information on the type of presentations as well as their acuity, complexity and other information such as infectivity of conditions. Staffing levels should reflect the need to deliver care to the number of patients seen. They should also take into account

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how much care and time each case demands. A resuscitation case would necessitate a large number of staff involved for a long time. Complex cases demand a more in-depth assessment of both history and examination, thus occupying the clinician for a lengthy period of time. Infrastructure needs could also be informed by this information. The number of resuscitation beds available, and the presence of isolation areas for infective patients or aggressive patients would be important.

3. Protocol Development

   Anecdotally, a number of conditions present frequently to the EC. In times of epidemic, such as the paediatric gastroenteritis season, this is certainly the case. A review of case-mix presenting to ECs could confirm this anecdotal information. Protocols defining the investigation, management and disposition of patients with these common conditions would aid in fast-tracking care, as well as ensuring standard and good quality care, allowing clinicians more time to see complex cases. These are especially important in the more remote ECs where senior guidance is not available.

4. Undergraduate Teaching

   Undergraduates at UCT (Years 4-6) currently spend time in ECs and have training sessions in addition. This is an important platform in which to lay the foundations for EM principles, especially resuscitation. Knowing the conditions seen in local ECs will help to guide the emphasis of this programme.

Training of EM practitioners would benefit from the information in order to more clearly define:

- Core curriculum
- Examination syllabus
- Package of care definition
- Registrar rotation through other (non-EC) clinical areas

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The current curriculum directs a training rotation which is a four year programme, in which registrars rotate through three-month blocks encompassing Trauma, Paediatrics, ICU, EM, Obstetrics and Gynaecology, Anaesthetics and EMS. At least two years is spent in ECs. Encompassed in these rotations is Orthopaedics and General Surgery. In addition, time is spent in ENT, Opthalmology and Psychiatry. Registrars write a primary examination composed of clinically orientated basic science questions – Anatomy, Physiology, Pharmacology and Pathology; the final exam is clinical.

There are currently four EM registrar training programmes in South Africa: the University of the Witwaterstrand, Pretoria University, Limpopo University and the Joint Division of Emergency Medicine at the University of Cape Town (UCT) and Stellenbosch University (SUN) (in the Western Cape Province). The UCT / SUN programme trains 42 registrars; all other programmes together train an additional 24 registrars. While the majority of trainees gain their experience on the UCT/SUN platform, it is unclear whether they are being exposed to a profile of patients which is in line with their training curriculum. If not, changes to the curriculum will be required.

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AIM

The aim of this study is to determine whether the current Emergency Medicine Curriculum is appropriate, given the burden of disease seen in Western Cape Emergency Centres.

To achieve this aim, the study has the following objectives:

- Audit presenting symptoms, diagnoses, investigations and procedures in Emergency Centers where Emergency Medicine Trainees rotate
- Rank the conditions according to frequency
- Map these data to the current FCEM curriculum
- Conclude whether the curriculum covers the knowledge and skills needed for training of an EM specialist in the Western Cape.

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LITERATURE REVIEW

The databse of Medline, Pre-Medline and Embase on the OVID platform were searched, with the dates January 2005 till January 2009. Two separate searches were performed. For the first one, the search terms: Curriculum, Emergency Medicine, Teaching and Training were used. For the second one the search terms: Emergency Medcicine, Case-mix, Scope of Practice, Practice Analysis, Triage and clinical presentations were used. In addition, unpublished atricles and websites were sourced, notably the curricula for Emergency Medicine from the various countries to which the article alludes and South African papers looking at case-mix in ECs. Of note, there was a paucity of data relating to the case-mix seen in South African ECs.

Statistics South Africa (Stats SA) [11] present data on mortality and causes of death; these data are based on death notification forms collected from the Department of Home Affairs. The latest report relates to all deaths that occurred in 2006: ICD 10 coding was used to classify the conditions contributing to deaths, which limits the choice and specificity of diagnoses. ICD 10 codes are very broad categories and each disease could be included in multiple ICD 10 categories. Diseases that contributed to the death, but did not directly cause it, such as Diabetes Mellitus (DM), may not be included if the cause of death was sepsis, as an example. As with all death report data, there are limitations such as problems with the initial documentation on the death certificates (quality of documentation is dependent on the diligence of the author); errors include incorrect content and omissions; misreported or ill-defined causes of death, and under-registration of deaths). These problems tend to occur primarily in rural areas and in the paediatric population. Furthermore, for the purposes of a burden of disease audit, the study is not useful as morbidity data are not collected: the data do not include those conditions resulting in morbidity but not necessarily mortality and therefore do not reflect the majority of EC visits. However, despite these limitations the data are useful to a degree is understanding cause of death in South Africa. The top ten causes of mortality from the 2006 data for the Western Cape are presented in **Table 1**.

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Table 1: Stats SA Ten Leading causes of death in the Western Cape		
	Natural Causes	Non-Natural Causes
1	Tuberculosis (TB)	Events of Undetermined Intent
2	Ischaemic Heart Disease (IHD)	Assault
3	Diabetes Mellitus (DM)	Transport Accidents
4	Cerebrovascular Diseases (CVD)	Other External Causes of Accidental Injury
5	Chronic Lower Respiratory Tract Disease	Intentional Self Harm
6	Human Immunodeficiency Disease	Complications of Medical and Surgical Care
7	Malignant Neoplasms of the Digestive Organs	Sequelae of External Causes of Morbidity and Mortality
8	Other Forms of Heart Disease	
9	Malignant Neoplasms of Respiratory and Intrathoracic Organs	
10	Influenza and Pneumonia	

Table 2 compares the different causes of natural death in different provinces in South Africa. The comparison of non-natural death is limited by poor definition on the death registers, 66% being noted as "events of undetermined intent". This illustrates the differences in case-mix between different regions in South Africa itself.

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Table 2: Stats SA Ten Leading Natural causes of death in South Africa by Province									
	Western Cape	Eastern Cape	N Cape	Free State	KZN	North West	Gaut	Mpum	Limpopo
1	TB	TB	TB	Inf and Pneum	TB	TB	TB	TB	Inf and Pneum
2	IHD	Inf and Pneum	Inf and Pneum	TB	Int Inf Disease	Inf and Pneum	Inf and Pneum	Inf and Pneum	Int Inf Disease
3	DM	Int Inf Disease	CVD	Int Inf Disease	Inf and Pneum	Int Inf Disease	Other HD	Int Inf Disease	TB
4	CVD	Chronic LRTD	Chronic LRTD	Other HD	CVD	Other HD	Int Inf Disease	Dis IS	Other H
5	Chronic LRTD	CVD	Int Inf Disease	Dis IS	Other HD	CVD	CVD	Other HD	CVD
6	HIV	Other HD	Other HD	CVD	DM	Dis IS	DM	CVD	DM
7	Malig DT	DM	Dis IS	DM	HIV	HTN	IHD	DM	HTN
8	Other HD	HIV	IHD	Chronic LRTD	Other viral	Chronic LRTD	HIV	HIV	Dis IS
9	Neopl RT	Dis IS	DM	HTN	IHD	DM	Dis IS	Chronic LRTD	Chronic LRTD
10	Inf and Pneum	Other viral	HIV	HIV	Inf CNS	HIV	Other viral	HTN	Renal Failure
N Cape: Northern Cape; KZN: Kwazulu Natal; Gaut: Gauteng; Mpum: Mpumalanga									

Inf and Pneum: Influenza and Pneumonia; Int Inf Disease: Intestinal Infectious Diseases; Chronic LRTD: Chronic lower respiratory tract disease; Othe HD: Other forms of heart disease; Dis IS: Certain disorders of the immune system; Malig DT: Malignant neoplasms of the digestive tract; Neopl RT: Neoplasms of respiratory and intrathoracic organs; Inf CNS: Infectious diseases of the central nervous system; Other Viral: Other Viral Disease

Stats SA separated the natural from the non-natural causes of death. When the natural causes of death in the Western Cape were compared to other provinces, it was apparent that there were differences in ranking. The significant causes of death that all the provinces had commonly in the ten leading causes of death, were TB, DM, CVD, other forms of heart disease and influenza and pneumonia, although the ranking of these conditions differed per province. Where influenza and pneumonia was the leading cause of death in the Free State, it was only the tenth in the Western Cape. Intestinal infectious diseases was among the ten leading causes of death in all provinces except the Western Cape. It was only in the Western Cape that malignant neoplasms of the digestive organs and malignant neoplasms of the respiratory and intrathoracic organs were among the ten leading causes of death. This shows that the burden of disease relevant to an area is different even within a country. The comparisons are not simple to interpret. The conditions are classified according to ICD-10 codes. HIV is a surprise number 10 in some provinces. HIV may however have been classified under "Other viral disease" or "certain disorders of the immune system", which would certainly affect the results tabled. Some results however are informative and reflect the different conditions in the provinces. For example, the frequency of intestinal infectious diseases in Kwazulu-Natal and Limpopo provinces compared to the lack of these as causes of death in the Western Cape.

It is not possible to extrapolate a burden of disease from a different province, let alone another country: we need to look at the local burden of disease for a specific area when planning health priorities or training programmes.

Table 3 compares the top ten causes of death in the United States of America (USA) against South Africa (RSA) [14]. Of note, the causes countrywise in RSA differ from those specific to the Western Cape seen in **Table 1**. The top ten causes of mortality in the USA account for just under 80 % of all deaths.

Table 3: Comparison of the top ten causes of death in the USA versus RSA

	RSA	USA
1	TB	Diseases of the Heart

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2	Non Natural Causes of Death	Malignant Neoplasms
3	Influenza and Pneumonia	Cerebrovascular Diseases
4	Intestinal Infectious Diseases	Chronic Lower Respiratory Tract Diseases
5	Other forms of Heart Disease	Accidents
6	Cerebrovascular Diseases	Diabetes Mellitus
7	Diabetes Mellitus	Influenza and Pneumonia
8	Chronic Lower Respiratory Tract Diseases	Alzheimers Disease
9	Certain Disorders involving the Immune Mechanism	Kidney Diseases
10	HIV	Septicaemia

Even given the limitations of the comparison in Table 3, a glance at the list immediately reveals a vast difference between the burden of disease in South Africa versus a first world country such as the USA. It does not make sense to extrapolate an EM curriculum from those developed in other countries with different burdens of disease. This is even more obvious when morbidity data are taken in to account. This is discussed further in the next few paragraphs.

Locally, the Western Cape Burden of Disease Project [12] was a 3 year study completed in June 2007 and led by the Department of Public Health and Family Medicine at UCT and the Medical Research Council. The aims were to measure the burden of disease in the Western Cape, recommend a better mortality surveillance system and recommend appropriate interventions to reduce this burden, both upstream and downstream. The burden of disease was measured using mortality and morbidity data. The mortality data were derived from the official system of data collection based on Stats SA statistics, Home Affairs death records and Mortuary records. Morbidity data were derived from morbidity/mortality ratios from the WHO Global Burden of Disease study in 1996. [13] The data are therefore based mainly on mortality data, with extrapolation to morbidity figures. The study identified the five most common groups contributing to the burden of disease in the Western Cape, in descending order, to be:

1. Infectious Disease – Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) and Tuberculosis (TB)
2. Injury – Homicide and Motor Vehicle Accidents (MVA)
3. Mental Health Disease

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4. Cardiovascular Disease – ischaemic heart disease (IHD), cerebrovascular accidents (CVA), hypertension (HT), diabetes mellitus (DM)
5. Childhood Disease - HIV/AIDS; diarrhoea; low birth weight; acute respiratory infection; malnutrition

This study included those diseases contributing to morbidity and therefore potentially presenting to an EC. The causes are fairly closely aligned to those presented from mortality figures from Stats SA. [11] Mental health disease stands out as a notable difference. Since the morbidity figures were only extrapolated from WHO ratios, however, they are not accurate enough to extrapolate to conditions presenting to ECs in the Western Cape.

There is a need for more accurate studies to be done to derive this information. To this end, several audits looking at patient presentations at ECs in the Western Cape have been undertaken. The focus of these studies was mainly to guide planning of service delivery at the EC's based on data from patients seen. They did not examine the presentation of clinical complaints specifically, although these were looked at.

An audit at four Community Health Centers (CHCs) was done in 2007, to look at the use of emergency services at primary care level. [8] These CHCs are positioned widely over the Cape Town Metropole and are a good representation of the emergency case mix at primary care level over a wide area. Over 18,000 patients were prospectively analysed to map workload: patient acuity was represented by a proxy in the form of the Cape Triage Score (since modified as the South African Triage Scale (SATS) [15]). In this score, red and orange cases are considered urgent (to be seen either immediately or in less than 10 minutes), yellow are considered emergency (to be seen in less than 60 minutes) and green are considered delayed (to be seen in less than 240 minutes). The mean daily attendance was found to be 75 patients per EC; a mean of between 30-45% were triaged red or orange, 21-44% yellow and 30% green. This represented an even workload between urgent, emergency and delayed presentations. From a presentation perspective, presenting complaint was

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recorded from the triage history (the final diagnosis was not noted, and may have been different). The clinical presentations were not classified by ICD-10 coding but rather at the discretion of the investigator: further, only the top adult and paediatric diagnoses were recorded. Trauma accounted for 27.9 % of presentations (most of these were either assualts or motor vehicle accidents). Of adult medical cases the most common presentation was shortness of breath, although this was not subdivided further. The commonest paediatric presentation was gastroenteritis, although this study was undertaken in the diarrhoea season for the Western Cape.

The next level of care in the Cape Town Metropole from the CHC is hospital based. Two observational studies have looked at casemix in rural and urban regional hospitals in the Western Cape [9,10]. In the urban study in 2007, [10] data were separated into adult and paediatric cases. They were not classified by ICD-10 coding but rather at the discretion of the investigator. The top 10 presenting complaints or diagnoses are presented in **Table 4**. This study was limited as one month only was examined, and thus did not take into account seasonal variation.

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Table 4: Top ten clinical presentations to New Somerset Hospital EC		
	Adult	**Paediatric**
1	Head Injury	Gastroenteritis
2	Abdominal Pain	Lower Respiratory Tract Infection
3	Pulmonary TB	Upper Respiratory Tract Infection
4	Dyspnoea	Head or Facial Injury
5	Stab Chest	Skin Rash or Superficial infection
6	Lower Limb Injury	Bronchiolitis
7	Gastroenteritis	Epilepsy
8	Chest Pain	Asthma
9	Incomplete Abortion	Otitis Media or Externa
10	Upper Limb Injury	Accidental Poison Ingestion

In 2008 a retrospective analysis of patient charts looking at basic epidemiology of presenting patients was undertaken at a rural regional level hospital [10]. Of 17,000 patients in the study period, 1781 randomly selected charts were reviewed. Of all cases, 24% were paediatric; of all patients, 4.9% were red, 14.3% orange, 66.9% yellow and 13.9% green. The top three presentations were categorised as trauma, gastrointestinal and respiratory tract. Trauma was responsible for a

third of presentations. Final diagnoses were further defined and rated as percentage of presentation. The top clinical complaints are presented in **Table 5**. These are mostly grouped by system, however symptom complexes are also added (such as general weakness). This reflects the difficulty of categorising clinical presentations in EM patients who present with symptoms, which may not fit neatly into a system grouping. Someone presenting with shortness of breath may be in pulmonary oedema and thus be cardiovascular, or have pneumonia which would be respiratory. Since trauma was responsible for a third of presentations, this was further categorised into blunt and penetrating trauma, sexual assault and burns. Of these, the majority were blunt trauma, followed by penetrating trauma, sexual assault and then burns. The diagnosis was recorded separately and is also presented in **Table 5.** A final diagnosis may not be possible within the scope of an EC visit – this may be made later after investigation by an in– or out-patient speciality. Consequently, a differential diagnosis may be made: these were counted as multiple diagnoses per patient: these are placed in the same categories as the presenting complaint. It is clear that there is a difference in systems reflected between the presenting complaint and final diagnosis: it is important therefore from the EM perspective to have an approach to both symptom complexes and disease states. The top five categories of diagnoses were then sub-classified into disease entities within these groups. This complexity indicates the difficulty in analysing the scope of practice for EM.

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Table 5: Top clinical presentations to Paarl EC

	Presenting Complaint	Diagnosis
1	Trauma	Trauma
2	Gastrointestinal Tract	Respiratory Tract
3	Respiratory Tract	Gastrointestinal Tract
4	Nervous System	Genitourinary Tract
5	Musculoskeletal	Nervous System
6	Systemic or Metabolic	Skin
7	Cardiovascular	Ear Nose and Throat
8	Genitourinary Tract	Cardiovascular
9	Ear Nose and Throat	Systemic or Metabolic
10	General Weakness	Musculoskeletal
11	Skin	Intoxicated
12	Intoxicated	Psychiatric
13	Psychiatric	Ophthalmic

14	Ophthalmic	Unknown

Statistics on visits to ECs in the USA are used to guide healthcare policy there, and have been kept extensively for many years. An update on this was published in 2008. [16] In these data, conditions are classified according to ICD10 codes. Most hospital visits were for acute problems. Of these, trauma – which was composed of sprains and strains, superficial injury and open wounds of the extremities – accounted for three out of the top ten presentations. Abdominal pain was the third most common presentation and chest pain the fourth. These two are symptom complexes or presenting complaints rather than diagnoses, and this is indeed how patients present in the EC environment. Soft tissue back complaints ranked fifth in frequency of presentation, and headache seventh: these complaints are most often benign in nature, but may indicate extremely serious pathology. Other conditions which featured in the top ten were infective processes: upper respiratory infections, skin and subcutaneous infections and urinary tract infections. These can all present with a spectrum of severity, from minor infections to overwhelming sepsis. Given anecdotal evidence that the acuity of patient conditions in RSA is generally higher than those seen in first world countries such as the USA, and the differing disease profile, it would be interesting to see a breakdown of the diagnoses and triage scores of these conditions.

The report also commented on chronic conditions resulting in EC visists. The patients who presented with these conditions were more likely to be admitted. This suggests that these patients presented with high acuity illness. Management of these patients would therefore demand an expert level of knowledge to manage. In addition, they would need substantial resources. An EM curriculum therefore, needs to cover not only acute but also chronic conditions. It would, however, focus on the acute presentations from chronic conditions. Three general reasons for admission, accounting for all of the top ten reasons for admission, were respiratory problems, cardiac problems and sepsis. Pneumonia was the single most frequent reason for admission. When this data is loosley compared to the RSA studies discussed above, there is correllation with the most common presentations –

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trauma, respiratory and cardiac. The conditions and acuity of which these are composed in RSA may be vastly different from those seen in the USA. A similar analysis performed in RSA is needed to establish this.

Some research overseas has been done into appropriateness of curricula guided by a study looking at case-mix. This is more easily done in the overseas setting than in RSA, as overseas ECs have advanced data collection systems, however this has not been extensively used to guide curriculum design. "The College of Emergency Medicine curriculum: is the specialty-specific knowledge section fit for purpose?" looked at case mix in the UK [17] in one teaching hospital EC. The diagnoses were then mapped to the College of Emergency Medicine (CEM) curriculum. Using a retrospective audit of notes from two separate two-week periods, 1047 diagnoses were derived. The vast scope of knowledge needed by an EM physician was noted, and it was found that the curriculum covered all presentations and diagnoses seen. No similar study has been done in South Africa.

The RSA curriclum [3] is meant only as a guide to major topics. It is not based on the scope of practice of Emergency Medicine. It is stated in the document that the curriculum is meant as a minimum requirement, rather than an exhaustive list. There is no explanation of how the curriculum was drafted; the authors are not documented. It is presented as a list of groupings, with no weighting attached to each area, and the investigations and procedures required for those groupings are not paired to the clinical conditions. It is divided into three different sections: the primary component encompasses anatomy, pharmacology, physiology and pathology, and is grouped into very broad categories (such as surface anatomy, or cellular injury and adaptation). None of the groupings are coupled to a clinical area. The syllabus for the final examination is grouped variously by sub-speciality areas (eg prehospital emergency care), symptom complexes (such as acute signs and symptoms in adults), systems (like cardiovasular emergencies) and procedures (for instance, emergency wound management). The final section describes Training objectives for the four-year rotation, and discusses which specialities need to be covered and how much time should be spent in each of these. In addition, it lists the required skills needed to be gained within all those areas – for

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example, ECG interpretation. ECG interpretation is, however, not listed as a skill in the syllabus for the final exam.

Looking overseas, the first American Emergency Medicine curriculum [4] was drafted in 1975, by an organisation now known as the Society for Academic Emergency Medicine (SAEM) and was called the Core Content of Emergency Medicine. It was a list of common conditions, symptoms and diseases which would be seen and managed in an EC; this was revised four times, and in that time expanded from 5 to 20 pages. The list relied on expert opinion, not evidence based practice analysis. In 1997 it was undertaken to draft a Model of the Clinical Practice of Emergency Medicine in the USA. A task force was developed to draft core content for a curriculum; it was clear that there was a paucity of data on which to base this curriculum. This task force recommended that a practice analysis be undertaken to provide the foundation of this core content, or curriculum.

The practice analysis was based on empirical data reviewed by expert panel - six different organisations had input into the document. There have been revisions every two years since then, the latest being in 2009. [4] Core clinical competencies for the practice of Emergency Medicine are described, representing both academic knowledge and skills needed. Six general core competencies are described: patient care, medical knowledge, practice-based learning and improvement, interpersonal skills, professionalism, and systems-based practice. This serves as a basis for curriculum design (both pre and post-graduate), evaluation of physician performance, research agendas, registrar programmes and proformas or protocols needed for the functional operation of the specialty. The resulting document, the Model of Clinical Practice of Emergency medicine [5], sets out the clinical practice of EM as well as the knowledge required. It is a consensus document with an impressively long list of contributers.

The EM Model consists of three components:

1. A list of common conditions, symptoms and disease presentations
2. Assessment of severity
3. Tasks needed to provide appropriate emergency care

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The lists of conditions, symptoms and diseases were derived from were based on data collected by the National Centre for Health Statistics at the Centers for Disease Control and Prevention collected from 40,000 Emergency Department records in 1995-96. Both signs and symptoms and pathophysiologies were included. This is because most patients present to the EC with symptom complexes rather than diagnoses. The final list was compiled by an expert panel based on frequency of occurrence, acuity of symptoms and other components of EM practice such as clinical governance, department management and research. Acuity was considered important to guide the prioritising of managements steps that the EM physician should follow. The tasks needed for management and assessment of the various patient presentations were reviewed and included in the document. Incorporated into the document are processes which are followed by the EM physician while delivering care to the patient. A matrix was developed that encompassed the listing of conditions, grouped by anatomical area and severity. Thus, the curriculum development in the USA began as a list of conditions based on expert opinion, but with the general trend of medicine towards evidence based practice, it is intuitive that future curricula should be based on harder data than expert opinion. The USA are moving towards this model. This process is time-consuming and needs input from a large panel of EM physicians who are interpreting the data. In the RSA there are problems relating to the ease and accuracy of data collection, as well as a much smaller pool of EM specialists given the newness of the speciality, rendering this process more difficult. However, it is not impossible.

According to the College of Emergency Medicine in the UK, EM is defined as “a field of practice based on the knowledge and skills required for the prevention, diagnosis and management of acute and urgent aspects of illness and injury affecting patients of all age groups with a full spectrum of undifferentiated physical and behavioural disorders. It further encompasses an understanding of the development of pre-hospital and in-hospital emergency medical systems and the skills necessary for this development”. [5] The UK curriculum [6] was compiled from expert consensus from doctors who have completed training in Emergency Medicine, together with training documents from Australasia

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and the USA. In addition, the curricula of other UK specialities such as Surgery and General Medicine were reviewed. The expert panel was composed of EM consultants who had completed the training programme. The Board of the College of Emergency Medicine was also involved. There is currently a Delphi study being performed in the UK, looking at EM scope of practice with the reworking of the basic sciences curriculum in mind. The proposed curriculum was last updated in April 2009. [18] This is in-line with the process being performed in the USA, and acknowledges the limitations of a curriculum based purely on expert consensus.

The curriculum is presented as a matrix. The heading is a broad topic such as Respiratory Medicine: the broad objectives for this are stipulated – such as history and examination, investigations and procedures. This is then sub-divided into conditions, such as asthma. Each of these is set out with objectives for academic knowledge and to manage the condition (the required basic science knowledge is included in this). A recommendation of learning methods for the material is included – eg personal study or learning from trainers. The method of assessment is also stipulated. Paediatrics and Geriatrics are integrated under each condition. There is however no ranking of importance in terms of severity and frequency of conditions. This would be useful to guide study and training priorities given the vast scope of knwoledge required for successful practice in EM.

The Australasian College for Emergency Medicine (ACEM) describes EM as “a field of practice based on the knowledge and skills required for the prevention, diagnosis and management of acute and urgent aspects of illness and injury affecting patients of all age groups with a full spectrum of episodic undifferentiated physical and behavioural disorders; it further encompasses an understanding of the development of prehospital and inhospital emergency medical system and the skills necessary for this development.” [6] The Australasian Training and Examination Handbook of 2008 [6] identifies core competencies, learning objectives and levels of practice. This model was based on expert consensus and examination of international EM curricula, especially that of Canada. It is meant to provide a framework for trainee study. This is similar to the process in the UK, with the same limitations faced there.

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The curriculum is grouped into broad categories such as resuscitation and cardiovascular medicine. These are then subdicided into more specific complaints such as syncope or acute coronary syndromes. Each heading is categorised as to whether it is a clinical presentation, general clinical system, investigation, or procedure. In addition, for each category, one of three expected levels of practice is defined. The expert level expects that the physician posesses the knowledge and skills needed to manage this condition or perform this procedure without needing to consult further for advice. An example is knowledge and practice of the triage process. The high level requires that the physician has the skills to manage the condition in its acute setting in order to stabilise the patient, however the input of other specialities may be required for continuing care. An example of this is laryngotracheobronchitis. The general level requires the knowledge needed to recognise and diagnose a condition, and deliver supportive care but recognises that a specialist in that field would need to be involved early. An example of this is neuralgia.

It is clear, therefore, that there is little national or international consensus on an EM curriculum, beyond an acknowlegment that there needs to be further work done on drafting a clear guidance model. The International Federation of Emergency Medicine formed a committee to develop an international EM curriculum at medical student level. [19] This is the first step to the development of a framework well-structured post-graduate EM training programme. The draft is a framework meant to lend itself to adaptation for developed or developing nations. The committee involved in drafting the document was an international committee composed of experts in emergency medicine and a variety of other physicians and other health care providers. The end point of the committee's work resulted in a consensus framework outlining knowledge needs and learning objectives for the medical student as a foundation in EM. A curriculum format was presented as an example, however the final curriculum contents are still being developed. Even more useful, going forward, would be a post-graduate registrar training curriculum developed from data looking at case-mix in these settings. The document is promising as a guide to international curricula, especially in a country such

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as the RSA, wher there is significant third world pathology and limited availablility of resources. It would be a valuable document to contribute to curriculum development going forward in the RSA.

EM as a speciality was acknowledged to be unique in certain areas. Patients present with symptoms and not a specific diagnosis. The focus is often on a differential diagnosis rather than management of a specific condition. Essentially any condition may present to an EC, not limited to paediatrics or obstetrics as an example. Trauma is a notably large portion of the work of an EC. Environmental problems such as hypothermia are likely to present to an EC rather than any other area. Chemical, radiological and biological incidents will present to an EC and this area needs to be prepared to protect itself and the rest of the hospital from threats of contaminations. The EC is open to all-comers. EC staff, more than any other speciality, are often exposed to difficult situations where behaviorly disturbed patients, due to substance abuse or mental illness, represent a threat to staff and other patients. The relatives of the patients are often emotionally stressed as the presentation of the patient is usually unplanned. In these two scenarios, the EM physician needs to be able to cope with management of potential confrontation.

The interface between an EC and the pre-hospital management of patients is a continuum. An EM physician works closely with pre-hospital personnel to maintain the uninterrupted managemant of a patient. There is a need for EM physicians to be comfortable and familiar with the pre-hospital environment, and communicate with the health care professionals involved in a mutually understandable language. This is doubly important in a major incident situation. The management of major incidents will revolve around the EC as a starting point. EM physicians need to be knowledgeable about major incident plans, both in-hospital and pre-hospital. Decision making is an important part of the role of the EM physician. These decisions are made both within a limited time-frame and with a paucity of information. The EM physician therefore needs to approach the patient using a focused history and examination and formulate a prioritised differential diagnosis and management plan.

In the Western Cape, local policy [20] defines EC core activities as “The resuscitation, assessment

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and treatment of acute illness and injury in patients of all ages by appropriately trained and experienced staff, according to current national and local standards, and the onward referral of patients as required". The document further clarifies roles and processes expected from ECs in the Western Cape. Given the stated 10 % per annum increase in EC visits in the province, ECs are in danger of being overrun: there is a need for a core definition of the scope of practice of EM, so that patients who attend the EC inappropriately are directed to other areas, such as clinics or out-patients services, without impacting on service delivery to those patients in need of emergency care. The Western Cape Department of Health Acute Hospital Packages of Care (POC) further defines EC scope of practice.[21] This document intends to be a guidance on the organization of health services in the province. It is intended to be fluid, and will be reviewed as knowledge, population needs and lessons learned from experience develop and unfold. According to the POC, a level one service is provided by a family physician or medical officer. Level two services require a general specialist, and level 3 services are provided by a sub specialist with specific skills.

In terms of EM, it is difficult to separate levels of care by facility as presentation of these patients to an EC is not delineated by these levels. While protocols can be made to direct those patients to an appropriate level of care facility via the pre-hospital services, self-presentations cannot be similarly controlled. In addition, pre-hospital services will take a critical patient to the nearest available EC to be stabilized and not necessarily to a higher level facility. The requirements of EM staff are therefore to assess, stabilize, manage the initial presentation and then refer on appropriately to a particular speciality and level of care. The general requirements demanded of EM staff in the POC initial assessment, stabilisation, resuscitation in terms of managing ABCs, accurate triaging of patients and the management of major incidents. The need for advanced life support training, triage skills and decision-making skills is highlighted.

Patients in the following categories are included in the core service expected of EM according to the POC. These are in line with the document describing ECs in the Western Cape discussed above [20] :

- Acute traumatic injuries

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- Acute illness encompassing medical, surgical, paediatric, obstetric & gynaecological emergencies.
- Pain, unrelieved by simple analgesia.
- Change in mental status, including alteration of consciousness, acute confusional states, acute worsening of functional psychotic disorders as well as patients with severe, suicidal depression
- Patients brought to hospital by the police
- Poisonings (toxicology and envenomation)
- Environmental injury/illness

These definitions are clearly very broad. A better understanding of the scope of practice seen day to day in ECs in the Western Cape is needed to better define this, in attition to guiding curriculum development.

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METHODS

Pilot study

We undertook a pilot study in March 2009, in the form of a cross sectional, prospective case note review. The data extraction sheet used is shown at **Appendix A.** The form was completed by clinical staff at the time of patient consultation. Any information missing on collation of the data was be sourced from the records retrospectively. Data were to be collected from the EC blocks where UCT / SUN Emergency Medicine Registrars are currently trained:

- Victoria Hospital
- New Somerset Hospital
- Paarl Hospital
- G F Jooste Hospital
- Tygerberg Hospital
- Groote Schuur Unit
- Red Cross Children's Hospital

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The pilot revealed that the data collection system was unworkable: in the best case scenario, only 40% of patients had data collection sheets completed. The method of data collection was changed as a result of this pilot.

Methods

We undertook a cross-sectional, retrospective audit of patients presenting to ECs in Cape Town.

Study setting

From the pilot sites, the final study was restricted to:

- Victoria Hospital (VHW)
- New Somerset Hospital (NSH)

- Paarl Hospital

Together, these hospitals have an annual EC attendance of 118 000 patients (VHW 38000, NSH 36 000, Paarl 44 000). The three hospital were chosen because of their similarities and the general nature of the consitions that present there.They all see a similar number of patients and are staffed by a similar staff number. They are all level two facilities. They all see paediatrics, medicine, surgery, orthopaedics, gynaecology , psychiatry and trauma. Both Paarl and NSH see obstetrics, but VHW does not. Specialities such as opthalmology, plastic surgery and neurosurgery, as examples, are represented at tertiary level and conditions requiring these services are thus referred on from these hospitals for management. The Western Cape EM registrars rotate through all of the facilities. On a practical level, the filing system in all three hospitals is efficient and relatively easy to access.

Data were collected on patients who presented to the study sites on randomly chosen 24-hour periods on one week date and one weekend date, over two separate time periods (one in summer (March) and one in winter (August/September)).

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Inclusion and Exclusion

Patients were considered for inclusion if they presented to the study site ECs within the defined time period. Data were excluded if the folders were not accessible, or if the patient had incomplete medical notes (such as left before being seen).

Data collection

The patient list was collected from the patient registers kept in the ECs. The final data collection sheet (**Appendix B**) was used by the Principal Investigator to collect the data. Any data not already noted was sourced from the patient folders.

Data collected included:

- Demographics

- Time of presentation
- Triage category
- Presenting complaint
- Final Diagnosis or Differential
- Investigations and Procedures
- Disposition

The presenting complaint (as recorded by the triager) and the final diagnosis (as recorded by the Dr) were grouped together as clinical complaints. The results were tabled and ranked according to frequency of presentation. If an existing medical condition, such as hypertension, was deemed to be relevant to the presenting complaint, such as chest pain, this was included as an additional diagnosis. If the patient presented with more than one diagnosis then these were counted as more than one presentation: for example, a patient who was involved in a motor vehicle accident may have had multiple injuries such as a pneumothorax, a fractured femur and a head injury. These would all be stand alone presentations. If the presenting complaint and final diagnosis differed, they were both added as stand alone conditions. The total number of clinical presentations therefore exceeds the number of patients investigated.

Both presenting complaints and final diagnoses were very varied, depending on the clinicians completing the paperwork. To counter this, wording was standardised. The clinical diagnoses were then grouped into general categories. Thus, a chest infection is grouped as lower respiratory tract infection (LRTI); however, this encompasses pneumonia, infective exacerbation of chronic obstructive airway disease (COAD) and bronchitis. Tuberculosis (TB) was stand alone, as this is a chronic condition. Similar processes were applied to each symptom and/or diagnosis.

Data were collated in a Microsoft Excel (Richmond, Va) document using pivot tables, and then mapped to the current South African EM curriculum.

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Procedures were those tasks performed by clinicians needing particular skills training, and included investigations needing particular skills, such as pleural taps and lumbar punctures. Investigations were deemed to be those that were performed by other technical staff, such as blood tests or radiology, but require interpretation by clinical staff.

Ethics

Ethical approval was granted by the UCT Faculty of Health Sciences ethics committee REC REF

All data were stored in an anonymous fashion on a password protected work computer.

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ARTICLE FOR SUBMISSION

Is the current South African Emergency Medicine curriculum fit for purpose? – An Emergency Medicine practice analysis.

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MeSH Words:
curriculum, post graduate education, emergency medicine, case-mix, scope of practice, practice analysis

Word Count:
3263

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Abstract

Objectives

To determine whether the current South African Emergency Medicine Curriculum is appropriate for the burden of disease seen by registrars in Cape Town Emergency Centres.

Method

This is a cross-sectional retrospective audit of patients presenting presenting to a range of secondary level Emergency Centres in Cape Town. The type of clinical presentations, investigations done and procedures performed were analysed. Basic descriptive statistics are presented.

Results

A total of 1283 clinical presentations from three seconday level ECs in Cape Town were collated. Of these clinical presentations, 47 were not included in the South African Emergency Medicine curriculum; in addition, 2 were only included in the paediatrics section. 115 procedures were tabled, of these, 11 were not included in the curriculum. 730 investigations were tabled; 527 were not included in the curriculum.

Conclusions

The curriculum did not cover all the clinical conditions, procedures and investigations encountered by EM registrars in Cape Town. In addition, there were multiple categories in the curriculum that were not encountered in EM practice at all. The investigations section of the curriculum correlated particluarly poorly with the skills needed for the burden of disease seen in ECs in Cape Town. The curriculum should be redrafted guided by a practice analysis of EM.

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Introduction

Emergency Medicine (EM) is a new specialty in South Africa and, as such, the scope of practice is still being defined in our context. [1,2] The scope, frequency and acuity of presenting complaints and diagnoses seen in Emergency Centres (ECs) in South Africa should be used to guide curriculum development, training and assessment of EM registrars. Better understanding the patients seen in our ECs would provide a foundation to help develop the existing core curriculum for EM training in South Africa. [3] It would help to ensure that locally produced specialists are appropriately trained for the patients which they will see in their ECs.

South Africa is a country of 49 million people living with a clash of the first and third world (Census Estimate Mid-Year 2009) [4]. The population face multiple disease processes such as infectious diseases (tuberculosis and HIV), trauma (violence and motor vehicle accidents), chronic diseases (diabetes, heart disease and malignancy), as well as mental health disorders. [4] The burden from mental health disorders is linked to substance abuse, especially from alcohol and amphetamines, known locally as TIK. Thus, the population faces not only diseases linked to poverty but also diseases associated with affluence; diseases that occur in very different socio-economic groups.

In this context, there is a dire need for Emergency Medicine (EM): in recognition of this, in 2003 it was established as a specialty. As with most young disciplines, the scope of practice is still being defined in our context. [1,2] In the case of EM the scope of practice is multidisciplinary, and concerned with "resuscitation, stabilisation and appropriate disposition" of patients. [1] The profile is different from those of first world countries in case mix, but also has different challenges in terms of difficult work environments.

One of the first steps in establishing a new speciality is defining the core curriculum against which specialists will train. The South African EM curriculum [3] was drafted prior to commencement of the EM training programme, and was based on international curricula. Despite the fact that the curriculum is intended only as a guide, it is essential that it is relevant to the workload actually

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experienced on a daily basis in ECs by EM trainees. While a curriculum for EM can be guided by those already established (such as those in the USA, UK and Australia) [5,6,7], these do not necessarily apply to South Africa. A locally produced curriculum is essential.

The current curriculum directs a training rotation which is a four year programme, in which registrars rotate through three-month blocks encompassing Trauma, Paediatrics, ICU, EM, Obstetrics and Gynaecology, Anaesthetics and EMS. At least two years is spent in ECs. Encompassed in these rotations is Orthopaedics and General Surgery. In addition, time is spent in ENT, Opthalmology and Psychiatry. Registrars write a primary examination composed of clinically orientated basic science questions – Anatomy, Physiology, Pharmacology and Pathology; the final exam is clinical. It is expected that on admission to the registrar programme, trainees have completed to date ACLS, ATLS and APLS or PALS courses. Regisrars are also expected to complete five short courses, ranging from the Emergency Management of Severe Burns to the Major Incident Medical management and Support course. [8]

There are currently four EM registrar training programmes in South Africa: the University of the Witwaterstrand, Pretoria University, Limpopo University and the Joint Division of Emergency Medicine at the University of Cape Town (UCT) and Stellenbosch University (SUN) (in the Western Cape Province). The UCT / SUN programme trains 42 registrars; all other programmes together train an additional 24 registrars. While the majority of trainees gain their experience on the UCT/SUN platform, it is unclear whether they are being exposed to a profile of patients which is in line with their training curriculum. If not, changes to the curriculum will be required.

There is very limited research looking at casemix in ECs our setting. Most research looking at burden of disease is derived from mortality figures and as such does not include those diseases contributing to morbidity. [8,9,10] In addition, these figures reflect the population seen by all medical specialities and not specifically EM. There are some small studies, limited to primary care settings or single secondary level ECs that examine EM casemix in the Western Cape [12,13,14], but none of these

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studies has addressed the question of whether the patients seen are in line with the national EM training curriculum.

International EM curricula [5,6,7] are constantly being refined guided by evidence and expert consensus; in one such recent study, a single-centre EC practice analysis was mapped to the national EM curriculum for the UK [15], and concluded that the curriculum covered all the topics seen in the EC. We need an evidence-based answer to the same question in RSA ECs.

The South African curriclum [3] is meant as a guide to major topics, and is not based on the scope of practice of Emergency Medicine. It is presented as a list of groupings, with no weighting attached to each area, and the investigations and procedures required for those groupings are not paired to the clinical conditions. It is divided into three different sections: a primary component which encompasses anatomy, pharmacology, physiology and pathology and is grouped into very broad categories (such as surface anatomy, or cellular injury and adaptation). The syllabus for the final examination is grouped variously by sub-speciality areas (eg prehospital emergency care), symptom complexes (such as acute signs and symptoms in adults), systems (like cardiovasular emergencies) and procedures (for instance, emergency wound management). The final section describes Training objectives for the four-year rotation, and discusses which specialities need to be covered and how much time should be spent in each of these. In addition, it lists the required skills needed to be gained within all those areas – for example, ECG interpretation. ECG interpretation is, however, not listed as a skill in the syllabus for the final exam.

International scope of practice in EM may well differ from that seen in South Africa. An accurate assessment of our workload, casemix and acuity level of presentations at ECs is essential to help define the scope of training for EM registrars, including their core curriculum, examination syllabus (both primary and final examinations), and registrar rotation through clinical areas. There are currently four EM registrar training programmes in South Africa: the Joint Division of Emergency Medicine at the University of Cape Town (UCT) and Stellenbosch University (SUN) (in the Western Cape Province) trains two thirds of EM registrars nationally. While the majority of trainees gain their

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experience on the UCT/SUN platform, it is unclear whether they are being exposed to a profile of patients which is in line with their training curriculum. If not, changes to the curriculum will be required.

We undertook a study to determine whether EM trainees in the Western Cape are working in line with the EM curriculum.

Methods:

We undertook a cross-sectional, retrospective audit of patients presenting to ECs in Cape Town.

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Study setting

The study occurred at three training sites for EM registrars, with a combined annual EC attendance of 118 000 patients:

- Victoria Hospital
- New Somerset Hospital
- Paarl Hospital

Inclusion and Exclusion

Patients were considered for inclusion if they presented to the study site ECs within the defined time period. Data were excluded if the folders were not accessible, or if the patient has incomplete medical notes (such as left before being seen).

Data collection

Data were collected on randomly chosen 24-hour periods on one week date and one weekend date, over two separate time periods (one in summer (March) and one in winter (August/September). The patient list was collected from EC patient registers.

Data collected by the Principal Investigator included:

- Demographics
- Time of presentation
- Mode of Presentation
- Triage category
- Presenting complaint
- Final Diagnosis or Differential
- Investigations and Procedures
- Disposition

The presenting complaints or diagnoses were classified according to the authors' discretion.

The presenting complaint (as recorded by the triager) and the final diagnosis (as recorded by the Dr) were grouped together as clinical complaints. The results were tabled and ranked according to frequency of presentation. If an existing medical condition was deemed to be relevant to the presenting complaint, this was included as an additional diagnosis. If the patient presented with more than one diagnosis then these were counted as more than one presentation: for example, a patient who was involved in a motor vehicle accident may have had multiple injuries such as a pneumothorax, a fractured femur and a head injury - these would all be stand alone presentations. If the presenting complaint and final diagnosis differed, they were both added as stand alone conditions. The total number of clinical presentations therefore exceeds the number of patients investigated.

Both presenting complaints and final diagnoses were varied, depending on the clinicians completing the paperwork. To counter this, wording was standardised. The clinical diagnoses were then grouped into general categories: Thus, a chest infection is grouped as lower respiratory tract infection (LRTI); however, this encompasses pneumonia, infective exacerbation of chronic obstructive airway disease

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(COAD) and bronchitis. Tuberculosis (TB) was stand alone, as this is a chronic condition. Similar processes were applied to each symptom and/or diagnosis.

Procedures were those tasks performed by clinicians needing particular skills training, and included investigations needing particular skills, such as pleural taps and lumbar punctures. Investigations were deemed to be those that were performed by other technical staff, such as blood tests or radiology, but require interpretation by clinical staff.

Data were collated in a Microsoft Excel (Richmond, Va) document using pivot tables, and then mapped to the current South African EM curriculum.

The acuity of presentations was also recorded, using the South African Triage Score [16].

Ethics

Ethical approval was granted by the UCT Faculty of Health Sciences ethics committee (REC REF: 313/2008). All data were stored in an anonymous fashion on a password protected work computer.

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Results:

In total, 697 patients were seen on the study period across the three ECs. Of these, 83 (11.9%) were not found and 44 patients (6.3%) absconded before being seen. The total number of folders searched was 569 (81.6%).

The clinical presentations are presented in **Table 1**. Where there is no corresponding category in the syllabus, this is marked with a dash. Those with (P) next to the classification are listed only under paediatrics in the curriculum. There were 1283 separate diagnoses. The most frequent clinical complaint involved trauma – specifically blunt injury (5.9%), which includes assaults, motor vehicle accidents and falls. The second most frequent was abdominal pain (4.9%). Of the top 10 clinical complaints, seven are covered by the curriculum, and an additional one is only covered in the

paediatrics section. Of note, there were multiple clinical complaints which were seen only once or twice.

Table 1: Table of Clinical Presentations

The procedures performed are presented in **Table 2.** A total of 115 procedures were performed; the most frequent five procedures were suturing, Plaster of Paris, LP, joint reduction and Incision and Drainage. Of these, only three are covered in the curriculum. Regional anaesthesia and procedural sedation were performed 1.7% and 5.2% of the time respectively.

Table 2: Table of Procedures

The investigations that were ordered are presented in **Table 3**. There were 730 investigations performed; the five most frequent were Chest X Ray (CXR), Full Blood Count (FBC), Creatinine Urea and Electrolytes (CUE), ECG and other Xrays. Of these, only CUE is referred to in the curriculum. Ultrasound was performed 4.5% of the time.

Table 3: Table of Investigations

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Discussion:

EM is a new speciality in South Africa [1,2], and the curriculum and registrar rotation requirements are based largely on consensus and international curricula [5,6,7] - it is not evidence-based. These international curricula may not be appropriate for training in our setting, where the burden of disease is large and little is known about the case mix involved. This practice analysis is an important step towards definition of the scope of knowledge and technical skills important for training of EM registrars locally, while keeping this in-line with international best-practice.

In this study the top ten clinical complaints were blunt injury, abdominal pain, breathlessness, lower respiratory tract infections, soft tissue injury, lacerations, chest pain, TB, gastroenteritis and fever. (**Table 1**) This list would suggest that training should focus on trauma, the respiratory, abdominal system and cardiovascular systems, and infectious diseases. This is an impressively large number and breadth of differing clinical presentations seen and as such does not lend itself to the classic Pareto distribution of data. Considering the limitations of this study discussed below, these data are likely to suggest a trend, rather than definitive numbers, and may not be accurate enough to use as a basis to draft an EM curriculum.

With regard to investigations, (**Table 2**) the majority perfomed were blood tests and radiology. Ultrasound is an emerging tool in South African EM. This was performed in 4.5% of cases, often as an elective by radiographers. Many of theses were gynaecological investigations. This suggests that Point of Care Ultrasound is an important part of the EM curriculum, both in terms of academic knowledge and skills development. Brain CT scans only accounted for 1.4% of the investigations performed. This is surprising given the heavy trauma load seen in our setting. The sample hospitals do not have CT scans on site, and as such need to refer their patients to other facilities for this investigation. These patients may not return with the results if they had a positive finding that required treatment at the referral facility, and thus that data would be lost to the system. In addition, in the Metropolitan area of Cape Town, patients with severe head injuries are transferred from the primary scene directly to a tertiary centre and bypass the secondary level centres, and these would not reflect in the data presented.

There was a wide range of procedures performed, the most common of which (by far) was suturing. Clearly, EM specialists should be expert in this field, and adequate time should be allocated in skills training for advanced suture techniques. This is currently required in the curriculum (registrars need to pass the Basic Surgical Skills Course). Regional anaesthesia was only used in 1.7% of cases. This is a valuable skill in the setting of ECs in the RSA, where patient load and low staffing levels do not allow for adequate monitoring of a sedated patient. The infrequent use of this may reflect the lack of

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training of clinicians in this skill , however no local studies have been done to confirm this. Procedural sedation was used in 5.2% of cases. This is a small number given the multiple indications for this such as fracture manipulation, complicated suturing, foreign body removal and lumbar puncture. A study performed in Cape Town in 2008 looked at procedural sedation practice in ECs. EC managers and doctors from 13 different ECs – both public and private sector – were interviewed. [16] This study found that an estimated 44 procedures a month were done under procedural sedation in the public sector, where a mean 2898 patients per month were seen. This was less than the 41 procedures a month for 1694 patients seen in the private sector. It was noted that the public sector lacked monitoring equipment, staffing numbers to monitor the patients and training of staff, who were often more junior. Only two units had protocols to guide the procedural sedations practice. Lumbar Puncture was in the top three conditions (12.2%). This is unsurprising given the HIV burden seen in our setting, and is a skill that clearly needs to be taught. Given the frequency of this procedure, staff have many opportunities to be instructed in the performance of this procedure, as well as opportunities to practice it.

Comparisons to the data gathered in previous studies performed in the Western Cape [12,13,14] would not be helpful, given the differing methods used in collecting data, the differing levels of care of the study settings and the different aims of those studies. However, the UK study [16], found that there was a good correllation between the UK curriculum and the case-mix seen in the ECs, compared to the poor correlation seen in this study. This suggests that further input into curriculum development in the RSA is necessary.

While the above data can guide us in curriclum mapping mapped to frequency of caonditions and skills needed, note would certainly need to be made of serious but infrequent presentations and skills. The obvious case here is resuscitation training. While resuscitation cases are infrequent, clearly the knowledge and skills needed should be well-known and practiced, and at the fingertips of the staff concerned. This is already addressed in training of EM registrars in the form of mannequin

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scenario training. In terms of the above data, the proxy for these cases would be acuity as measured by the SATS. In addition, expert consensus would be needed to translate this in to curriculum needs.

Limitations

There are several limitations to this study.

Sample Hospitals

All hospitals involved in this study were secondary level hospitals. Most major polytrauma cases bypass the secondary level facilities, and anecdotally most minor cases are seen at primary level. Similarly, burns cases may be underrepresented as dedicated burns units are not housed at this level of care. Similar arguments may be made for other case types, and a larger study across more sites would be helpful to address this concern. In the RSA there is a large private sector, which may have a different case-mix given the different socio-economic grouping of the patients. Including these facilities would be valuable given that EM trainees should be trained for al settings encountered in the RSA and in-line with international best practice.

Data collection

Data collection systems in state hospitals in Cape Town are not accurate: patient registers are dependent on the accuracy of the data enterer. An 81% recovery rate of folders is reasonable, although the missing 19% of cases may have changed the patient profile somewhat. Data collected from patient folders is dependent on the note-keeping of clinicians, which is generally poor. For the purposes of this study, we could only record what was actually written by the clinician, not what should have been done.

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How should we use this information? In order to extrapolate the data to a guided curriculum, one would need to fulfil several conditions. Firstly, the data would need to be accurate. An ongoing audit ideally provided by an accurate EC computer system across multiple hospitals providing all levels of care and serving the whole of the Western Cape would provide this information. This would be able to group curriculum components by frequency of presentation and acuity of condition. Secondly, expert consensus would be needed to develop a workable organisation of grouping of symptoms, clinical conditions, investigations and procedures and integrate these with the knowledge needed both for primary and final examination levels. Lastly, the above would need to be presented in a matrix to guide both learners and examiners.

An international workgroup has been set up by the International Federation of Emergency Medicine to draft a curriculum for the EM medical school curriculum. [15] This is a starting point to developing set standards and programmes worldwide.

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Conclusion:

The EM training curriculum in South Africa needs to be more clearly defined to guide development of the speciality. This is a complex and lengthy procedure. More data are needed to inform the process, of which this study is an important first step. An accurate and appropriate curriculum will help to improve standards of care over time.

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Table 1: Table of Clinical Presentations

Curriculum Classification	Presenting Complaint or Diagnosis	Total	% of total
-	Blunt Injury	76	5.9%
3.8	Abdominal Pain	63	4.9%
3.2	SOB (Shortness of Breath)	47	3.7%
7.1-4	LRTI (Lower Respiratory Tract Infection)	47	3.7%
-	Soft Tissue Injury	43	3.4%
-	Laceration	38	3.0%
3.1	Chest Pain	37	2.9%
7.5	TB (Tuberculosis)	35	2.7%
8.11	Gastroenteritis	35	2.7%
4.1 (P)	Fever	35	2.7%
8.11	Diarrhoea	35	2.7%
-	Cough	35	2.7%
-	Pain	29	2.3%
21	Fracture	28	2.2%
4.3 (P)	URTI (Upper Respiratory Tract Infection)	26	2.0%
-	Infection	26	2.0%
12.3	RVD (Retroviral Disease)	23	1.8%
-	MVA (Motorvehicle Accident)	21	1.6%
18.2	OM (Otitis Media)	20	1.6%
-	Penetrating Injury	19	1.5%
-	Headache	19	1.5%
20.4	Head Injury	19	1.5%
-	Vomitting	18	1.4%
3.10 17.5	Seizures	18	1.4%
-	PV (Per Vaginal) Bleeding	17	1.3%
6.1	ACS (Acute Coronary Syndrome)	16	1.2%
7.8	Asthma	16	1.2%
15.1; 15.2; 15.4	DM (Diabetes Mellitus)	16	1.2%
18.2	Tonsillitis	15	1.2%
19.5	Abscess	15	1.2%
10.1	Abortion	15	1.2%
23.1	Behavioral Disturbance	14	1.1%
-	Weakness	13	1.0%
6.8	Hypertension	13	1.0%
-	Back Pain	12	0.9%
7.9	COPD (Chronic Obstructive Pulmonary Disease)	12	0.9%
17.9	Meningitis	12	0.9%
8.3	GORD (Gastro-Oesophageal Reflux Disease)	12	0.9%
13	OD (Overdose)	11	0.9%
-	Rash	10	0.8%
-	Psychosis	10	0.8%
-	Constipation	10	0.8%
6.4	CCF (Congestive Cardiac Failure)	10	0.8%
-	Collapse	9	0.7%
7.7	Haemoptysis	9	0.7%

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13.3	Intoxication	8	0.6%
18.2	Epistaxis	8	0.6%
-	Epilepsy	8	0.6%
17.3	CVA (Cerebrovascular Accident)	7	0.5%
19.6	Cellulitis	7	0.5%
-	Swollen Leg	7	0.5%
-	PID (Pelvic Inflammatory Disease)	7	0.5%
-	Burns	7	0.5%
21	Dislocation	7	0.5%
9.2	Renal Infection	6	0.5%
-	Ectopic	6	0.5%
3.10	Confusion	5	0.4%
2.13	Arrhythmia	4	0.3%
-	Allergic reaction	4	0.3%
5.8	Bite	4	0.3%
7.5	PTB (Pulmonary Tuberculosis)	4	0.3%
16.7	Cancer	4	0.3%
3.9	GI (Gastro Intestinal) Bleed	4	0.3%
22.7	Arthritis	4	0.3%
15.1	Hypoglycaemia	4	0.3%
3.1	Delirium	4	0.3%
-	Toothache	3	0.2%
15.2	Hyperglycaemia	3	0.2%
3.7	Syncope	3	0.2%
8.12	Gallstones	3	0.2%
15.2	DKA (diabetic Ketoacidosis)	3	0.2%
-	CRF (Chronic Renal Failure)	3	0.2%
-	FB (Foreign Body)	3	0.2%
8.13	Hepatitis	3	0.2%
7.6	Pneumothorax	3	0.2%
7.1-3	Pneumonia	3	0.2%
-	Pleural Effusion	3	0.2%
8.5	Appendicitis	3	0.2%
23.4	Panic Attack	3	0.2%
8.6	Bowel Obstruction	3	0.2%
-	Febrile Convulsion	2	0.2%
9.2	UTI (Urinary Tract Infection)	2	0.2%
-	Urinary Symptoms	2	0.2%
10.3	Hyperemesis Gravidarum	2	0.2%
17.4	Dizziness	2	0.2%
-	Thyroid Mass	2	0.2%
-	Ascites	2	0.2%
8.1	Haemorrhoids	2	0.2%
8.14	Pancreatitis	2	0.2%
6.1	IHD (Ischaemic Heart disease)	2	0.2%
-	Abdominal Mass	2	0.2%
-	Shingles	2	0.2%
3.9	Haematemesis	2	0.2%
9.3	Epidydimo-orchitis	2	0.2%
-	Migraine	2	0.2%

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-	DVT (deep Vein Thrombosis)	2	0.2%
9.3	Prostatitis	2	0.2%
-	Needle stick	1	0.1%
-	LOW (Loss of Weight)	1	0.1%
2.11	Hypercalcaemia	1	0.1%
-	Haematuria	1	0.1%
-	Glomerulonephritis	1	0.1%
10.2	PV (Per Vaginal) Discharge	1	0.1%
-	PVD (Peripheral Vascular Disease)	1	0.1%
8.13	Jaundice	1	0.1%
9.1	Renal Colic	1	0.1%
8.9	Diverticulitis	1	0.1%
17.6	Peripheral Neuropathy	1	0.1%
6.5	SBE (Endocarditis)	1	0.1%
-	Acute Abdomen	1	0.1%
24.2	Sexual Assault	1	0.1%
-	Pericardial Effusion	1	0.1%
9.3	Hydrocoele	1	0.1%
22.2	Costochondritis	1	0.1%
6.7	PE (Pulmonary Embolus)	1	0.1%
2.12	Hypokalaemia	1	0.1%
-	Milia	1	0.1%
-	Temporal Arteritis	1	0.1%
-	Palpitations	1	0.1%
20.12	Arterial Injury	1	0.1%
6.9	AAA (Abdominal Aortic Aneurysm)	1	0.1%
-	Urinary Retention	1	0.1%
22.7	OA (Osteoarthritis)	1	0.1%
-	Dementia	1	0.1%
-	Nerve Injury	1	0.1%
18.1	Conjunctivitis	1	0.1%

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Table 2: Table of Procedures

Curriculum Classification	Procedure	Total	% of total
5.4-5	Sutures	35	30.4%
21.1	POP (Plaster of Paris)	18	15.7%
-	LP (Lumbar Puncture)	14	12.2%
21.1	Joint Reduction	7	6.1%
-	I&D (Incision and Drainage)	6	5.2%
5.2	Procedural Sedation	6	5.2%
-	FB (Foreign Body) Removal	3	2.6%
-	Pleural Tap	3	2.6%
2.13	Cardioversion	2	1.7%
6.2	Thrombolysis	2	1.7%
2.3	RSI (Rapid Sequence Intubation)	2	1.7%
-	Nasal packing	2	1.7%
-	XR (XRay)	2	1.7%
21.2	Splint	2	1.7%
-	IV (Intravenous) Sedation	2	1.7%
-	ICD (Intercostal Drain)	2	1.7%
5.2	Regional Anaesthesia	2	1.7%
21.2	Fracture Manipulation	2	1.7%
-	Ascitic Tap	1	0.9%
-	Cauterization	1	0.9%
21.2	Sling	1	0.9%

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Table 3: Table of Investigations

Curriculum Classification	Investigation	Count	% of total
-	CXR (Chest X Ray)	149	20.4%
2.12	CUE (Creatinine Urea and Electrolytes)	128	17.5%
-	FBC (Full Blood Count)	116	15.9%
-	ECG (Electrocardiogram)	67	9.2%
-	XR (X Ray)	66	9.0%
-	Pregnosticon	36	4.9%
25.2-4	U/S (Ultrasound)	33	4.5%
-	Udipstix (Urine Dipstix)	29	4.0%
-	Trop (Troponin)	19	2.6%
2.11	ABG (Arterial Blood Gas)	18	2.5%
-	Lipase	18	2.5%
-	AXR (Abdominal X ray)	17	2.3%
25.5	CT Brain	10	1.4%
-	BAL (Blood Alcohol Level)	7	1.0%
13	Tox (Toxicology) screen	5	0.7%
-	LFT (Liver Function Tests)	3	0.4%
16.1	Clotting	3	0.4%
25.5	CT Chest	2	0.3%
2.11	VBG (Venous Blood Gas)	2	0.3%
25.5	CT Abdo	1	0.1%
25.5	CT Neck	1	0.1%

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Acknowledgements:

The original idea was by Kirsten Cohen. Kirsten Cohen collected the data and wrote the first draft. All authors contributed to the final artticle. Kirsten Cohen is the guarantour of the paper.

Competing Interests:

There were no competing interests

Funding:

There was no funding

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PROPOSAL AS SUBMITTED FOR ETHICS

RESEARCH PROPOSAL FOR DISSERTATION:

An Analysis of the Clinical Practice of Emergency Medicine in Emergency Centres in the Western Cape.

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MMed Emergency Medicine UCT

February 2009

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Introduction:

Emergency Medicine is a new specialty in South Africa and the scope of practice is still being defined in our context. The scope and frequency of presenting complaints and diagnoses seen in Emergency Centres (ECs) in South Africa should be used to guide training and assessment of Emergency Medicine trainees.

There is very limited research looking at casemix in ECs our this setting. Most research looking at burden of disease is derived from mortality figures and as such does not include those diseases contributing to morbidity. A more accurate assessment of our workload and patient population will be useful not only in terms of defining the scope of training for Emergency Medicine (EM) doctors, but also to guide health system priorities and primary prevention. Results of a practice analysis would provide a foundation to aid in the development of core content of the curriculum recommended for EM in the Western Cape and South Africa, representing the needs of the specialty.

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Background:

Emergency Medicine became a specialty in South Africa in April 2005 (1). South Africa is a country with both first and third world populations, encompassing the diseases that occur in these very different socio-economic groups. As a new specialty, a curriculum and scope of practice defined specifically for the conditions in this country is needed. While guidelines can be taken from already established curricula such as those in USA, UK and Australia, these do not necessarily apply to South Africa. The current curriculum (2) was drafted prior to commencement of the EM training programme as it is now, and was based on international training programmes. Given the demanding work conditions and extreme pathology seen in South African hospitals, we now need to look at whether this is appropriate in a South African setting.

The syllabus as presented in the Fellowship of the College of Emergency Medicine of South Africa [FCEM(SA)] Portfolio (Appendix A) (2) is not well-defined and is meant as only a guide to studying. There is ongoing work in defining international curricula, guided by practice analyses done in those countries. These curricula are comprehensive and rank level of knowledge needed dependent on acuity and frequency of presentation of particular conditions or presenting complaints.

Emergency Medicine is a vast specialty and one cannot be a specialist in all fields thus it would be better if our curriculum were better structured to guide study for trainees.

The Burden of Disease Project (3) was a 3 year study completed in June 2007 and led by the Departments of Public Health and Family Medicine at the University of Cape Town. The aims were to measure the burden of disease in the Western Cape, recommend a better mortality surveillance system and recommend appropriate interventions to reduce this burden, both upstream and downstream. The burden of disease was measured using mortality and morbidity data. The mortality data were derived from the official system of data collection based on Stats SA statistics, Home Affairs death records and Mortuary records. Morbidity data was derived from morbidity/mortality ratios from the WHO Global Burden of Disease study in 1996. The data are therefore based mainly on mortality data, with extrapolation to morbidity figures.

The study identified the burden of disease in the Western Cape to be:

1. Infectious Disease – Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), tuberculosis
2. Injury – Homicide, road traffic accidents
3. Mental Disease
4. Cardiovascular Disease – ischemic heart disease, cerebrovascular accidents, hypertensive heart disease, diabetes mellitus

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5. Childhood Disease - HIV/AIDS; diarrhea; low birth weight; acute respiratory infection; malnutrition

Stats SA data (4) identify the 20 leading causes of mortality for South Africa but are based on mortality data only. In addition, the classification system is very non-specific. For example, pneumonia is listed but is not further classified. (Thus Pneumocystis implying HIV/AIDS infection would not be apparent).

The causes of mortality are summarized in Table 4.13

The American Emergency Medicine curriculum (5) was drafted initially in 1975. It took the form of a practice analysis of the new specialty of Emergency Medicine with the aim of developing core content. Essentially it was a list of common condition, symptoms and diseases seen and evaluated in Emergency Departments. This list relied on expert opinion, not empirical analysis.

In 1997 it was undertaken to draft a Model of the Clinical Practice of Emergency Medicine in the USA, based on empirical data and several expert panels. This was initially completed in 2001 and has since been revised in 2003, 2005 and most recently 2007 (5). The aim is to describe core clinical competencies for the practice of Emergency Medicine, representing the information and skills needed. This can serve as a basis for curriculum design (both pre and post-graduate), evaluation of physician performance, research agendas, registrar programmes or SOPs needed for the functional operation of the specialty.

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Table Distribution of causes of Death 2006

Rank	Cause of Death	No of Cases in which death was Reported
1	Tubercuolosis	89 062
2	Influenza and pneumonia	86995
3	Ill-defined/Unknown causes of Mortality	77 346
4	Other forms of heart disease	56 530
5	Intestinal Infectious Diseases	44 400
6	Events of Undetermined Intent	35 587
7	Cerebrovascular diseases	34 926
8	Hypertensive diseases	32 410
9	Certain disorders involving the immune mechanism	28 997
10	Metabolic Disorders	23 780
11	General Symptoms and Signs	22 807
12	Other Viral Diseases	22 515
13	Diabetes Mellitus	21 780
14	Chronic lower diseases respiratory	21 537
15	Other diseases of the respiratory system	21 092
16	Ischemic heart diseases	18 754
17	Other bacterial diseases	18 273
18	Renal failure	17 705
19	Symptoms and signs involving the circulatory and respiratory systems	15 749
20	Human Immunodeficency Virus diseases	14 969

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The EM Model consists of three components:

1. Assessment of patient severity

2. Tasks needed to provide appropriate emergency care

3. A list of common conditions, symptoms and disease presentations

The lists of conditions, symptoms and diseases were derived from were based on data collected by the National Centre for Health Statistics at the Centers for Disease Control and Prevention collected from 40,000 Emergency Department records in 1995-96. The final list was compiled by an expert panel based on frequency of occurrence, acuity of symptoms and other components of EM practice such as clinical governance, department management and research. A matrix was developed that encompassed the listing of conditions, grouped by anatomical area and severity.

The United Kingdom curriculum (6) was compiled from expert consensus who have completed training in Emergency Medicine, together with training documents from Australasia and the USA. The core clinical curriculum is grouped into conditions, each set out with objectives, academic knowledge, skills needed and learning and assessment methods. There is however no ranking of importance in terms of severity and frequency of conditions. Paediatrics and Geriatrics are integrated under each condition.

The Australasian Training and Examination Handbook of 2008 (7) identifies core competencies, learning objectives and levels of practice. These set out under each topic what should be learnt, thus helping to provide a framework for study planning for trainees.

Levels of practice have been allocated to each topic, those expert or high to be examined more often and thoroughly. The document was drawn up using a majority consensus process.

Several audits looking at patient presentations at ECs in the Western Cape have been done. The focus of these studies was mainly to guide planning of service delivery at the EC's based on data from patients seen.

An audit at four Community Health Centers (CHCs) was done in 2007 to look at the use of emergency services at primary care level (8). The mean daily attendance was found to be 75 patients per EC. Of these in the adult category, 4% were triaged red, 28% orange, 34% yellow and 30% green. This suggests an even workload between urgent, emergency and delayed presentations. The majority of

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presentations were trauma (assaults and motor vehicle accidents mainly), shortness of breath and diarrhoea in children.

An observational study of patient presentations in a one month period at New Somerset Hospital Emergency Center was done in December 2007 (9). The aim was to report on demographics, acuity, waiting times, referral mechanism and outcome of EC consultation at a secondary hospital. A mean of 102 patients were seen per day. 18% of these were paediatric patients. The majority of presentations were trauma (25%), then respiratory (14%), abdominal (14%), neurological (8%), sepsis (6%) and cardiac (4%). These are further classified into more specific complaints such as head injury. The top paediatric presentations were, in order of frequency, gastroenteritis, respiratory tract infections and head injuries. One quarter of these patients were admitted, the remainder investigated or fully managed by the EC itself.

A retrospective analysis of patient charts looking at basic epidemiology of presenting patients was done at Paarl Hospital from 1 January till the end of May 2008 (10). 17 000 patients were seen, and a random sample of charts was analyzed. 1781 charts were reviewed, 24% of whom were children. The triage categories were 5% red, 14% orange, 33% yellow and 13% green. The top three presentations were trauma, gastrointestinal and then respiratory tract complaints. Trauma was responsible for a third of presentations. Final diagnoses were further defined and rated as percentage of presentation. This study also looked at tests performed, such as bloods and imaging, as well as procedures performed and medication given. Recommendations were made regarding systems needed to better EC patient management.

Robinson, Vincent et al (11) took a sample casemix seen in the EC and mapped them to the curriculum. They used a retrospective audit of notes from two separate two-week periods. It was found that the curriculum covered all presentations and diagnoses seen. However, this was in the United Kingdom and no similar study has been done in South Africa.

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Aims and Objectives:

Aim:

To determine whether the current Emergency Medicine Curriculum adequately prepares Emergency Medicine trainees for the burden of disease seen in Western Cape Emergency Centres.

To achieve this aim, the study has the following objectives:

- Take a snapshot of presenting symptoms and diagnoses and procedures done seen in Emergency Centers where Emergency Medicine Trainees work
- Map the conditions to the current Emergency Medicine Curriculum
- Rank the conditions according to frequency and severity
- Establish whether the curriculum outlined adequately prepares the trainees for the job at hand.

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Methods:

This is a cross-sectional prospective audit of presenting complaints and diagnoses presenting to a range of ECs in the Western Cape. These audits will be performed using a specified 24 hour period on a week date and a specified weekend date, over two separate times, one in summer (March) and one in winter (July). The days for each EC will vary, the data collection being done at different units on different days, to oversee data collection, and ensure a wider range of dates for collection.

This will be done from the EC records via a data extraction sheet. (Appendix B) The initial triager will fill in the presenting complaint and SATS score and patient details. The doctor seeing the patient will fill in the final and contributing diagnoses. Any information found missing on collation of the data will be looked for in the records retrospectively.

The presenting complaints or clinical scenarios and final diagnoses will be collected and ranked as to frequency and acuity, using acuity measures with the South African Triage Score (12). A matrix will be designed organizing these into acuity groups and tasks required to treat and stabilize these patients, as well as incorporation of research and management.

The data will be collected from the general emergency medicine acute care blocks in hospitals in the Western cape where US/UCT Emergency Medicine Registrars are currently trained.

These are:

Victoria Hospital EC

New Somerset Hospital EC

Paarl Hospital EC

G F Jooste Hospital EC

Tygerberg Hospital Trauma Unit

Grootte Schuur Hospital Trauma Unit

Grootte Schuur Hospital Emergency Unit

Red Cross Children's Trauma Unit

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The data sheet for data collection is presented (Appendix B).

The data will be used to derive the scope of knowledge and technical skills important for the training, ranked in order of priority and from this derive a spectrum of knowledge used to guide the curriculum and training needs for the specialty of Emergency Medicine.

Data collection will be done in March and July 2009. The study will be written up in August. No funding is required. The results will be published in a peer-reviewed journal.

Appendix A: Initial Data Collection Sheet

FOLDER NUMBER, AGE & SEX or STICKER	**Presentation Mode**	Walk-In	BIBA	CHC	GP
	Time	0800-1200	1200-1600	1600-2000	
		2000-0000	0000-0400	0400-0800	
	TEWS Score	NOT DONE	0	1	2	3	4	5	6	≥7
	SATS Colour	Blue	Red	Orange	Yellow	Green				

PRESENTING COMPLAINTS (please detail)			
Other (free text):			
Resuscitation:		Neurological:	
Cardiovascular:		Respiratory:	
Abdominal:		Genitourinary:	
Musculoskeletal:		Trauma:	
Psychiatric:		Obs & Gynae:	

FINAL / DIFFERENTIAL DIAGNOSIS (please detail)			
Other (free text):			
Cardio-Resp Arrest		Neurological	
Shock		Abdominal	
Cardiovascular		Genitourinary/O&G	
Respiratory		Psychiatric	
Musculoskeletal		Trauma	
Dermatological		Environmental	

PROCEDURES / SKILLS (please tick all used)					
Other (free text):					
Tracheal Intubation	RSI	CPR	Defibrillation	Cardiac Pacing	Cardioversion
Needle Crico	Surgical Crico	NIVV	Lumbar Puncture	Regional Nerve Block	Thrombolysis (MI)
Central Line	IO Line	Arterial Line	Pleural Tap	Suturing	Thrombolysis (CVA)
Pericardio-centesis	Needle Thoracocentesis	ICD	Procedural Sedation	Abdominal Paracentesis	FAST (US)
Fracture Reduction	Joint Reduction	Joint Aspiration	Tendon Repair	Fluid (EGDT) Resuscitation	Ultrasound
Suprapubic Catheter	Foreign Body Removal	Abscess Drainage			

DISPOSAL (please tick)						
Other (free text):						
Home	Ward	Theatre	ICU	Died	T/F other hospital	Refer to CHC

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Appendix B: Final Data Collection Sheet

Hospital and Unit			Dates			
Demographics Age/Sex Folder Number	Time of Presentation	Triage Category	Presenting Complaint	Final Diagnosis or Differential	Investigations and Procedures	Disposition

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Appendix C: Emergency Medical Journal Instruction to Authors

Original articles

For full length accounts of original research, often shorter articles are better. Additional information may be placed on the web site as a data supplement.

Word count: up to 3000 words.

Illustrations and tables: up to 6.

References: 25.

Peer review: all papers are reviewed by at least one reviewer. If there is uncertainty about acceptance after review, papers are reviewed by the editors.

All material submitted is assumed to be submitted exclusively to the journal unless the contrary is stated. Submissions may be returned to the author for amendment if presented in the incorrect format.

The title page **must** contain the following information:

1. The title.
2. The name, postal address, e-mail, telephone and fax numbers of the corresponding author.
3. The full names, institutions, city and country of all co-authors.
4. Up to five keywords or phrases suitable for use in an index (it is recommended to use MeSH terms).
5. Word count - excluding title page, abstract, references, figures and tables.

The manuscript format must be presented in the following order:

1. Title page
2. Abstract (or summary for case reports)
3. Main text (tables should be in the same format as your article and embedded into the document where the table should be cited; images must be uploaded as separate files)
4. Acknowledgments, Competing interests, Funding
5. Copyright licence statement
6. References
7. Appendices

Do not use the automatic formatting features of your word processor such as endnotes, footnotes, headers, footers, boxes etc. Provide appropriate headings and subheadings as in the journal. We use the following hierarchy: **BOLD CAPS, bold lower case**, Plain Text, Italics. Cite illustrations in numerical order (fig 1, fig 2 etc) as they are first mentioned in the text. Tables should be in the same

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format as your article and embedded into the document where the table should be cited. Images **must not** be embedded in the text file but submitted as individual files.

Statistics: Statistical analyses must explain the methods used.

Style: Abbreviations and symbols must be standard and SI units used throughout except for blood pressure values which are reported in mm Hg.
Acronyms should be used sparingly and fully explained when first used.

Figures/illustrations: Black and white images should be saved and supplied as GIF, TIFF, EPS or JPEG files, at a minimum resolution of 300 dpi and an image size of 9 cm across for single column format and 18.5 cm for double column format. Colour images should be saved and supplied as GIF, TIFF, EPS or JPEG files, to a minimum resolution of 600 dpi at an image size of 9 cm across for single column format and 18.5 cm for double column format. Images should be mentioned in the text and figure legends should be listed at the end of the manuscript. During submission, when you upload the figure files please label them as Figure 1, Figure 2, etc. The file label will not appear in the pdf but the order in which the figures uploaded should be sufficient to link them to the correct figure legend for identification. Histograms should be presented in a simple, two-dimensional format, with no background grid.

Tables: Tables should be submitted in the same format as your article and embedded into the document where the table should be cited. Tables should be self-explanatory and the data they contain must not be duplicated in the text or figures.

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References: Authors are responsible for the accuracy of references cited: these should be checked against the original documents before the paper is submitted. It is vital that the references are styled correctly so that they may be hyperlinked.

In the text: References must be numbered sequentially as they appear in the text. References cited in figures or tables (or in their legends and footnotes) should be numbered according to the place in the text where that table or figure is first cited. Reference numbers in the text must be given in square brackets immediately after punctuation (with no word spacing) - for example, [6] not [6]. Where more than one reference is cited, separate by a comma - for example, [1, 4, 39]. For sequences of consecutive numbers, give the first and last number of the sequence separated by a

hyphen - for example, [22-25]. References provided in this format are translated during the production process to superscript type, which act as hyperlinks from the text to the quoted references in electronic forms of the article.

In the reference list: References must be double spaced (numbered consecutively in the order in which they are mentioned in the text) in the [slightly modified] Vancouver style. Only papers published or in press should be included in the reference list. (Personal communications or unpublished data must be cited in parentheses in the text with the name(s) of the source(s) and the year. Authors should get permission from the source to cite unpublished data.)

Punctuation of references must follow the [slightly modified] Vancouver style:
12 Surname AB, Surname CD. Article title. Journal abbreviation. Year;Vol:Start page-End page.

Use one space only between words up to the year and then no spaces. The journal title should be in italic and abbreviated according to the style of Medline. If the journal is not listed in Medline then it should be written out in full.

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