

Emergency medicine in Paarl, South Africa: a cross-sectional descriptive study

Rens Hanewinkel · Henri P. Jongman · Lee A. Wallis · Terrence M. Mulligan

Received: 17 November 2009 / Accepted: 19 April 2010 / Published online: 9 July 2010
© Springer-Verlag London Ltd 2010

Abstract

Background Emergency Medicine (EM) in South Africa is in its earliest stages of development. There is a paucity of data about emergency department (ED) patient demographics, epidemiology, consultation and admission criteria and other characteristics.

Aims This information is absolutely necessary to properly guide the development of EM and appropriate emergency care systems. In order to provide this information, we performed a study in a rural hospital in Paarl, 60 km outside Cape Town.

Methods All patients who were seen in the ED between 1 January 2008 and 31 May 2008 were eligible for our research. We designed a cross-sectional descriptive study and retrieved information from a randomized sample of all consecutive patient charts seen during this period using a 40-point questionnaire (see Appendix 1).

Results We investigated 2,446 charts, of which 2,134 were suitable for our research. The majority (88.2%) of these patients were self-referred. In our sample, 24.1% were children under 12 years old. Almost 20% of patients had a serious pathological condition or were physiologically unstable; 36.0% of all presentations were trauma related. Besides trauma-related problems, gastrointestinal- (21.9%) and respiratory tract- (12.4%) related problems were most common in the ED; 16.5% of the patients were admitted to a ward.

Conclusion This descriptive epidemiological study provides necessary data that will be used for further needs assessments and for future EM development in Paarl, and can be used as a template in other EDs and hospitals to provide similar data necessary for initial EM development strategy.

Keywords Emergency medicine · South Africa · Demographics · Violence

Disclaimer: The views expressed in this paper are those of the author (s) and not those of the editors, editorial board or publisher.

R. Hanewinkel · H. P. Jongman (✉)
Erasmus University,
Rotterdam, The Netherlands
e-mail: henrijongman@hotmail.com

L. A. Wallis
Emergency Medicine,
University of Cape Town & Stellenbosch University,
Cape Town, South Africa

T. M. Mulligan
Emergency Department and Emergency Medicine Residency,
Universitair Medisch Centrum Utrecht,
Utrecht, The Netherlands

Introduction

In South Africa, the rates of violence and trauma have been reported as some of the highest in the world [1]. Nationally, 2.5 million cases of non-fatal injuries require emergency care, and an estimated 60,000 South Africans die of homicides and road traffic accidents each year: this translates to about 66 trauma presentations per 1,000 population per annum [2]. Diseases of the developing world also remain prominent; epidemiological and demographic shifts (caused by increased urbanization, aging of the population and gradual Westernization of lifestyles) have led to the emergence of non-communicable diseases, such as heart disease and cancer, as a major problem [1]. These factors combine to create situations

in which well-developed emergency medicine (EM) and emergency care systems are essential.

In 2004 EM was established as an official new specialty [3–5]. To meet the requirements of the specialty, EM specialists, EM training and a good working emergency care system are necessary. This includes appropriate emergency departments (ED) and emergency medical services (EMS) [5].

Previous estimates of ED workload in Cape Town have demonstrated that a significant proportion of presenting populations are emergency or urgent in nature, present to the ED outside of normal office hours, involve a large paediatric case mix and are typically walk-in or self-referred [6, 7]. There is a paucity of data about ED patient demographics, epidemiology and other characteristics in South Africa in general. This information is necessary to properly guide the development of appropriate emergency care systems. Previous articles have described the workload at level one [6] and urban secondary level hospitals [7], but there are no data on the situation in rural secondary level hospitals.

In order to provide this information, we designed this cross-sectional, descriptive study in a rural secondary level hospital.

Materials and methods

Study location

Paarl is located in the mountainous wine region outside of Cape Town, South Africa. Paarl Hospital is a 250-bed secondary level facility, which serves the needs of 600,000 people in a vast geographical, rural area; the population served is mainly uninsured.

Study population

We undertook a retrospective study of patients seen in the ED; all patients presenting to the ED between 1 January and 31 May 2008 were eligible for inclusion.

We used a standardized data extraction tool (Appendix 1) for data collection.

Patient folders were selected by random sample (based on the patient's identification number), using a random number generator. The sampled population was all patients who presented during this time.

Charts lacking the ED patient entry, or lacking all essential data points, were excluded.

Statistical analysis

Data were entered into a SPSS Data Entry Station 4.0 (SPSS Inc. 2003) database and were analyzed using SPSS

15.0 (SPSS Inc. 2006) for Windows. *P* values were calculated using a confidence interval analysis program (CIA version 1.0, 1989).

Results

A total of 16,996 patients presented during the study period. Of these, 2,134 were fully analyzed (Fig. 1).

Sample characteristics

There were 53.7% men [54.1% in the reference population ($P>0.05$)] and 512 (24.1%) were children aged 0–12 years (of whom 68.9% were under 4 years of age); there was no significant difference in the percentage of children from the reference population [23.4% ($P>0.05$)].

Referral and transportation

Referral information was available for 1,781 patients (83.6%); of these, most were self-referred (88.2%)—other patients were referred from clinics (6.9%), general practitioner (4.1%) or a specialist (0.8%).

Transport information was available in 1,841 (86.3%) of cases: 26.9% of these arrived by ambulance, 3.7% by police and the rest self-presented.

Time distribution

Days were split into six 4-h sessions; time data were available for all patients. Overnight periods were relatively quiet; there were no significant differences in the four periods between 0800 and 2400 hours (Fig. 2).

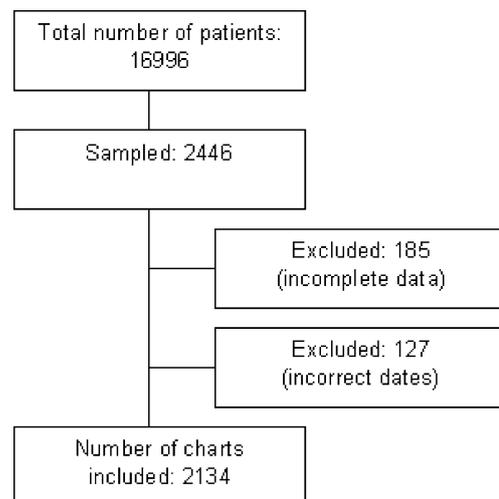


Fig. 1 Sample

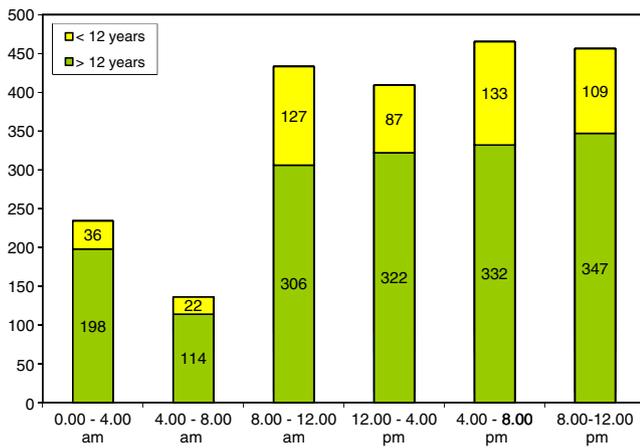


Fig. 2 Temporal arrival of patients ($n=2,134$)

Presentation times of trauma patients followed similar time patterns.

Time from arrival to triage, triage to doctor and doctor to disposal were too sporadically recorded to derive meaningful data.

Triage category

Paarl Hospital triages using the South African Triage Scale (SATS) [8]. This system divides patients into five groups:

- Green: minor injury/illness
- Yellow: physiologically stable cases with reasonably serious medical or trauma problems
- Orange: serious cases, with potentially unstable physiology or potentially life/limb-threatening pathological condition
- Red: resuscitation/physiologically unstable patients
- Blue: clearly dead

Triage information was available in 1,147 cases: overall 4.9% were red, 14.3% orange, 66.9% yellow and 13.9% green (with 1 blue patient).

There was no significant difference in severity between children and adults. We combined the yellow and green group and compared this with the combined red and orange group. For adults the less serious cases (yellow and green) accounted for 80.5% and the more serious cases (red and orange) for 19.4% and for children 81.6 and 18.4%, respectively (both $P>0.05$). We made the same analysis for self-presenting patients vs EMS patients. There was no significant difference in triage severity between self-presenting and EMS patients (both $P>0.05$). Self-presented patients had a serious pathological condition in 18.6% and EMS in 20.5% and less serious complaints in 81.4 and 79.5%, respectively.

Presenting complaint

Trauma was the commonest presenting complaint, occurring in 36% of cases. The commonest complaints are shown in Table 1 (several patients presented with more than one complaint).

With regard to the trauma patients, 65.7% were male, 56% were blunt in nature (predominantly falls or assault with a blunt item), 33.4% penetrating (although there were no gunshot wounds in our sample), 2.6% sexual assault and 2.5% burns (the cause was unknown in 42 cases).

Diagnosis

A total of 2,503 diagnoses were made in 2,134 patients (Table 2). These often did not correspond with the recorded presenting complaint.

The five commonest diagnostic categories accounted for 70% of patients: they were further analyzed (Table 3).

Treatment

A total of 1,097 (51.4%) patients had 1,394 procedures undertaken—including suturing, placing IV lines and chest tubes, and applying bandages and plasters.

Medications were administered in 87.1%, with more than half of these receiving analgesia (1,131, 53.0%), 593 (27.8%) antibiotics and 5.9% nebulized medication.

Disposition

A total of 565 patients (26.5%) were observed in the ED or the observation ward. Ward admission occurred in 353 (16.5%); 47 patients were transferred to another facility, and

Table 1 Commonest presenting complaints

Presenting complaint	%
Trauma related	36.0
Gastrointestinal tract	21.9
Respiratory tract	12.4
Nervous system	8.3
Musculoskeletal	7.3
Systemic/metabolic	6.6
Cardiovascular	5.1
Genitourinary tract	4.3
Ear nose throat	4.3
General weakness	3.7
Skin	3.6
Intoxicated	2.0
Psychiatric	1.5
Ophthalmic	1.1

Table 2 Diagnostic category

Diagnostic category	n (%)
Trauma	826 (33.0)
Respiratory tract	372 (14.9)
Gastrointestinal tract	330 (13.2)
Genitourinary tract	125 (5.0)
Nervous system	116 (4.6)
Skin	108 (4.3)
Ear nose throat	106 (4.2)
Cardiovascular	104 (4.2)
Systemic/metabolic	94 (3.8)
Musculoskeletal	77 (3.1)
Intoxication	50 (2.0)
Psychiatric	21 (0.8)
Ophthalmic	20 (0.8)
Unknown	154 (6.2)

13 patients (0.6%) died in the ED. A total of 200 (9.4%) did not complete their visit—146 left without being seen by a doctor (LWBS) and 54 left against medical advice (LAMA).

Disposal by diagnostic category is shown in Table 4.

Discussion

There is currently a general paucity of data concerning patient profiles in EDs in South Africa. This is essential background information to guide development of EDs, emergency care systems, and to develop the specialty of EM appropriately. Two prior reports have highlighted patient profiles in district (primary level) [6] and urban regional (secondary level) hospitals [7]. In addition to these prior studies, our study adds essential information by addressing the situation in a rural secondary level hospital.

Table 3 Most common diagnoses

Diagnosis	%	Mean age (years)	% Age <12years
Trauma			
Laceration head	20.3	31	10.7
Soft tissue head	9.0	23	29.7
Laceration hand	5.3	28	9.2
Laceration arm	5.0	29	9.8
Laceration back	4.2	32	2.9
Respiratory tract			
Pneumonia	29.8	24	48.6
URTI	23.1	8	86.0
PTB	14.8	44	5.5
Bronchospasm	8.6	41	28.1
Asthma	8.1	36	30.0
Gastrointestinal tract			
Gastroenteritis	44.2	18	63.0
Gastritis	9.1	31	10.0
Constipation	8.5	37	17.9
Abdominal pain	6.1	36	5.0
Dysentery	3.9	20	61.5
Genitourinary tract			
Urinary tract infection	25.6	42	0
Miscarriage	12.0	24	0
Pyelonephritis	9.6	35	8.3
Renal failure	7.2	59	0
Pregnancy	5.6	26	0
Nervous system			
CVA	25.9	58	0
Epilepsy	22.4	41	7.7
Convulsions	19.8	40	17.4
Headache	14.7	35	5.9
Meningitis	8.6	24	40.0

URTI upper respiratory tract infection, PTB pulmonary tuberculosis, CVA cerebrovascular accident

Table 4 Disposal by diagnostic category

Diagnostic category	n (%)				
	Observed	Admitted	Transferred	LWBS	LAMA
Trauma related	91 (12.9)	59 (8.4)	21 (3.0)	57 (8.1 %)	24 (3.4)
Respiratory tract	90 (31.3)	63 (21.9)	1 (0.3)	2 (0.7 %)	4 (1.4)
Gastrointestinal tract	111 (37.2)	58 (19.5)	4 (1.3)	3 (1.0 %)	6 (2.0)
Genital/urethral tract	33 (32.0)	31 (30.1)	0	0	4 (3.9)
Nervous system	64 (59.8)	28 (26.2)	7 (6.5)	1 (0.9 %)	2 (1.9)
Skin	24 (25.3)	34 (35.8)	2 (2.1)	4 (4.2 %)	2 (2.1)
Ear nose throat	7 (7.5)	2 (2.2)	0	1 (1.1 %)	2 (2.2)
Cardiovascular	52 (65.8)	23 (29.1)	2 (2.5)	2 (2.5 %)	1 (1.3)
Systemic/metabolic	36 (59.0)	18 (29.5)	1 (1.6)	2 (3.3 %)	1 (1.6)
Musculoskeletal	8 (11.8)	3 (4.4)	2 (2.9)	2 (2.9 %)	1 (1.5)
Intoxication	22 (46.8)	11 (23.4)	0	1 (2.1 %)	0
Psychiatric	10 (47.6)	8 (38.1)	1 (4.8)	1 (4.8 %)	1 (4.8)
Ophthalmic	1 (6.7)	0	3 (20.0)	0	0
Unknown	16 (10.3)	15 (9.7)	3 (1.9)	70 (45.2 %)	6 (3.9)

This study may be considered a representative sample of the attendees at Paarl—we analyzed a random 14.4% of all presentations during the study period.

Patient presentation

A seemingly high proportion of patients (88.2%) were self-referred; Paarl is a secondary level hospital, and one might expect lower self-referral rates (an urban population was found to have a self-referral rate of only 41% [7]). Of the self-referred cases in our sample, 897 (57.1%) had triage documented: 81.8% of these cases were yellow or green. This suggests that the ED deals with a significant primary care load and will have important implications for health policy development. Increased primary care provision and a focused public education campaign on the availability and proper utilization of primary care facilities seem appropriate.

Overall, the majority of patients were triaged yellow, in keeping with other South African data [2, 6, 7]. However, there is clearly a problem with application of the triage tool at Paarl. Focused and ongoing triage training are essential for the successful implementation of the tool.

EMS transport was used by 26.9% of patients, higher than international studies, which suggest utilization rates between 14 and 20% [9–11]. Patients who came in with EMS had similar distribution of SATS counts compared to patients who came in using their own transport. However, a large proportion of the population live far from the hospital, and most of them are very poor with limited access to private or public transportation. EMS are free below a certain earnings threshold [5], and therefore its high rate of usage may reflect the socio-economic realities of life in the area.

More trauma cases presented overnight than in the day, as may be expected given standard relationships between trauma and alcohol. South Africa is generally acknowledged to have one of the highest rates of trauma in the world [1]. In total, 36% of our cases were trauma related, which is a higher rate than other reported South African data (25–28% [6, 7]).

Gunshot wounds are extremely rare in the Paarl area: our sample contained no cases whereas others have reported up to 17.6% of fatalities in the ED to be due to firearms [12]. We did not analyze the reasons in this study.

There was a high incidence of both gastroenteritis and pneumonia, diseases common in patients with advanced retroviral disease. Human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) is rife in South Africa, with an estimated 16.6% affected (adults over 15 years) [13]. We did not analyze whether patients had known tuberculosis (TB) or retroviral disease; we chose to report the presenting complaint only. This may have led to a misrepresentation of the incidence of TB and HIV in our sample.

Future implications

The initial step in all developmental projects is the needs analysis, i.e. the cross-sectional descriptive study. These studies provide the first “snapshot” data that reveal the initial states of the system and reveal to EM development professionals “where we are now” in terms of the numbers, types and patterns of patients being seen and treatment methods used for any particular system or sub-system. EM systems development includes primary EM development

(education and patient care systems), secondary EM development (economic and legislative agendas) and tertiary EM development (health policy and public health agendas), and development strategies need to be inclusive of data points, initial states and patterns in all of these areas, and not just in areas concerning clinical care; of course many of these data points are not included in our study. Nevertheless, our cross-sectional descriptive questionnaire provides much of the initial epidemiological needs analysis that can then inform and drive these multiple stages of development, and can be used as a template for similar investigations in the many hundreds of EDs, hospitals and EM systems that are in similar stages of EM development as Paarl Hospital. This study can be used as a template for other similar EDs, hospitals and EM systems that are interested in investigating the states of their own EM systems, and in forming and providing structure for future EM development strategies. While many of these emerging EM systems are likely to be different in terms of levels of training, education, personnel, resources, language and culture, nevertheless the initial data that are provided by a similar questionnaire and similar cross-sectional descriptive data collection tools are essential to any EM development project.

Limitations

This study did not analyze the day of the week on which patients presented, which would have added helpful information. However, other South African studies reported Mondays and Tuesdays as the busiest days of the week, with the census up to 25% higher than other days of the week [6, 7].

Our sample included 13 patients who died during their stay in the ED. Unfortunately this number is too small to draw any conclusions about causes of death: as this would add helpful extra information, we undertook a second study, looking only at deaths (over a longer time frame): this will be presented elsewhere.

Conclusion

We performed a cross-sectional, descriptive study that showed some important demographic, epidemiological and operational features of an ED in rural South Africa. The collection and analysis of these data will no doubt influence the present and future development of EM and acute care systems for Paarl Hospital. These data will help to focus EM development strategies for Paarl Hospital, which will be better driven by the local needs that these data uncover: the heavy preponderance of penetrating trauma in this population indicates that more emphasis needs to be placed on trauma training and trauma systems development for Paarl Hospital, and on the link between pre-hospital services and trauma services that the proper treatment of such trauma patients mandates. Also, the large percentage of self-referred patients with primary care complaints indicates that future EM development must also link with larger development projects including primary care provision. It is these data, derived from a simple epidemiological descriptive tool such as our questionnaire, that highlight those areas in most need of attention and further development.

This study can be used as a template for other similar EDs, hospitals and EM systems that are interested in investigating the states of their own EM systems, and in forming and providing structure for future EM development strategies. Information of this kind is necessary to properly guide the improvement of emergency care and to guide the development of EM in Paarl Hospital, in South Africa, and elsewhere. Ongoing research in this field is required to better understand referral patterns and usage of EDs and other local, regional and national EM epidemiology throughout other areas of South Africa and beyond.

Conflict of Interest None.

Appendix 1: Questionnaire

a

Questionnaire Emergency Department

General characteristics						
1. ID number:	3. Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female	5. Race: <input type="checkbox"/> White <input type="checkbox"/> Black <input type="checkbox"/> Coloured <input type="checkbox"/> Asian <input type="checkbox"/> Not specified	6. Blood Pressure: /	9. Temperature:	11. Pain: <input type="checkbox"/> Yes <input type="checkbox"/> No	13. Cape Triage Score: <input type="checkbox"/> Red <input type="checkbox"/> Orange <input type="checkbox"/> Yellow <input type="checkbox"/> Green <input type="checkbox"/> Blue <input type="checkbox"/> Not specified
2. Date of visit:/...../.....	4. Date of birth:/...../.....		7. Heart Rate:	10. Refer from: <input type="checkbox"/> Clinic <input type="checkbox"/> Day hospital <input type="checkbox"/> GP <input type="checkbox"/> Specialist <input type="checkbox"/> Self <input type="checkbox"/> Not specified	12. Consciousness: <input type="checkbox"/> Awake <input type="checkbox"/> Reacts to voice <input type="checkbox"/> Unresponsive <input type="checkbox"/> Not specified	
			8. Breathing Rate:			
Complaints						
14. Problem (use nurses own words):						
15. Category of problem (check all that apply): <input type="checkbox"/> Nervous system <input type="checkbox"/> Cardiovascular <input type="checkbox"/> Respiratory <input type="checkbox"/> Gastro Intestinal Tract <input type="checkbox"/> Genital Urethral Tract <input type="checkbox"/> Musculoskeletal	<input type="checkbox"/> Ear Nose throat <input type="checkbox"/> Ophthalmic <input type="checkbox"/> Systemic/metabolic <input type="checkbox"/> Trauma related <input type="checkbox"/> Psychiatric <input type="checkbox"/> General weakness <input type="checkbox"/> Overdose <input type="checkbox"/> Skin <input type="checkbox"/> Drunk driver <input type="checkbox"/> Other:	16. Trauma: <input type="checkbox"/> Yes <input type="checkbox"/> No 17. Kind of trauma : <input type="checkbox"/> Blunt <input type="checkbox"/> Penetrating <input type="checkbox"/> Burns <input type="checkbox"/> Sexual assault	18. Penetrating: <input type="checkbox"/> Stab wound <input type="checkbox"/> Cut wound <input type="checkbox"/> Gunshot <input type="checkbox"/> Human bite <input type="checkbox"/> Dog bite <input type="checkbox"/> Traffic <input type="checkbox"/> Other:	19. Blunt: <input type="checkbox"/> Fight (no weapon) <input type="checkbox"/> Fight (weapon) <input type="checkbox"/> Fall <input type="checkbox"/> Traffic Accident <input type="checkbox"/> Other:	20. Place of occurrence: <input type="checkbox"/> Home <input type="checkbox"/> School <input type="checkbox"/> Sports <input type="checkbox"/> Street <input type="checkbox"/> Work <input type="checkbox"/> Prison <input type="checkbox"/> Unknown	
Diagnostics						
21. Laboratory: (check all that apply) <input type="checkbox"/> Blood <input type="checkbox"/> Electrolytes <input type="checkbox"/> White blood <input type="checkbox"/> Full Blood count <input type="checkbox"/> Sediment. Rate <input type="checkbox"/> CRP <input type="checkbox"/> Haemoglobin <input type="checkbox"/> Platelets <input type="checkbox"/> Culture <input type="checkbox"/> HIV serology <input type="checkbox"/> Trop T	<input type="checkbox"/> Liver <input type="checkbox"/> Arterial Blood gas <input type="checkbox"/> Alcohol <input type="checkbox"/> Pancreas <input type="checkbox"/> Ureum <input type="checkbox"/> Kreat <input type="checkbox"/> Glucose <input type="checkbox"/> Tox Screening <input type="checkbox"/> Other:	<input type="checkbox"/> Urine <input type="checkbox"/> Dipstick <input type="checkbox"/> Bacteria <input type="checkbox"/> Ketones <input type="checkbox"/> HCG <input type="checkbox"/> Glucose <input type="checkbox"/> Other:	22. Imaging: (check all that apply) <input type="checkbox"/> X-Ray <input type="checkbox"/> Extremities <input type="checkbox"/> Upper <input type="checkbox"/> Lower <input type="checkbox"/> Chest	<input type="checkbox"/> Spine <input type="checkbox"/> Cervical <input type="checkbox"/> Thoracic <input type="checkbox"/> Lumbar <input type="checkbox"/> Abdominal <input type="checkbox"/> Pelvis <input type="checkbox"/> Skull/Face <input type="checkbox"/> Other:	<input type="checkbox"/> Ultrasound <input type="checkbox"/> Heart <input type="checkbox"/> Abdomen <input type="checkbox"/> Pelvis <input type="checkbox"/> Extremities <input type="checkbox"/> Blood vessels <input type="checkbox"/> Other:	23. Other diagnostics: <input type="checkbox"/> Lumbar Puncture <input type="checkbox"/> Tuberculosis screening <input type="checkbox"/> ECG <input type="checkbox"/> Sputum <input type="checkbox"/> Referred for CT <input type="checkbox"/> Other:

b

Questionnaire Emergency Department

Diagnosis						
24. Diagnosis: Principal diagnosis:	25. Category of diagnosis: (check all that apply) <input type="checkbox"/> Trauma <input type="checkbox"/> Head <input type="checkbox"/> Chest <input type="checkbox"/> Back <input type="checkbox"/> Neck <input type="checkbox"/> Abdomen <input type="checkbox"/> Extremities <input type="checkbox"/> Upper <input type="checkbox"/> Lower	<input type="checkbox"/> Cardiac <input type="checkbox"/> Ischemia <input type="checkbox"/> Hypertension <input type="checkbox"/> MI <input type="checkbox"/> Dysrhythmia <input type="checkbox"/> Heart failure <input type="checkbox"/> Collaps <input type="checkbox"/> Hypotension	<input type="checkbox"/> Internal Medicine <input type="checkbox"/> DM related <input type="checkbox"/> Abdominal <input type="checkbox"/> Oncological <input type="checkbox"/> HIV <input type="checkbox"/> Systemic TBC <input type="checkbox"/> Burns <input type="checkbox"/> Drugs/ Intox <input type="checkbox"/> Hypoglycemia	<input type="checkbox"/> Neurologic <input type="checkbox"/> Infarction <input type="checkbox"/> Haemorrhage <input type="checkbox"/> Intracerebral <input type="checkbox"/> Subarachnoid <input type="checkbox"/> Subdural <input type="checkbox"/> Epidural <input type="checkbox"/> Epilepsy/convuls <input type="checkbox"/> Peripheral <input type="checkbox"/> Dizziness	<input type="checkbox"/> Infection <input type="checkbox"/> Cardiac <input type="checkbox"/> GI <input type="checkbox"/> Resp <input type="checkbox"/> Urogenital <input type="checkbox"/> Skin <input type="checkbox"/> Respiratory <input type="checkbox"/> Pneumothorax <input type="checkbox"/> TBC <input type="checkbox"/> Asthma <input type="checkbox"/> COPD <input type="checkbox"/> Pulm Edema	<input type="checkbox"/> Obstetric/Gyn/Uro <input type="checkbox"/> Delivery <input type="checkbox"/> Vag. Bleeding <input type="checkbox"/> Ectopic <input type="checkbox"/> Torsio <input type="checkbox"/> STD <input type="checkbox"/> Miscarriage <input type="checkbox"/> Other: <input type="checkbox"/> Musculoskeletal <input type="checkbox"/> Ophthalmic <input type="checkbox"/> Ear Nose Throat <input type="checkbox"/> Psychiatric
Treatment						
26. Procedures: <input type="checkbox"/> Laceration repair <input type="checkbox"/> IV Line <input type="checkbox"/> Central IV line <input type="checkbox"/> Intubation <input type="checkbox"/> Oxygen <input type="checkbox"/> Blood transfusion	<input type="checkbox"/> Chest tube/thorostomie <input type="checkbox"/> Surgery <input type="checkbox"/> Fixation/Bandage /Plaster <input type="checkbox"/> Catheter <input type="checkbox"/> Klyisma <input type="checkbox"/> Other (Specify):	27. Medication: <input type="checkbox"/> Pain medication <input type="checkbox"/> Antimicrobial drugs <input type="checkbox"/> Respiratory tract drugs <input type="checkbox"/> Cardiovascular drugs <input type="checkbox"/> Tetanus tox	<input type="checkbox"/> Neurologic drugs <input type="checkbox"/> Hormones <input type="checkbox"/> Immunological agents <input type="checkbox"/> Metabolic agents <input type="checkbox"/> Gastrointestinal agents <input type="checkbox"/> Vitamins	<input type="checkbox"/> Ophthalmic drugs <input type="checkbox"/> Hematologic agents <input type="checkbox"/> Skin/mucous membrane <input type="checkbox"/> Other (specify):		
Outcome / Disposition						
28. Ward admission: <input type="checkbox"/> No <input type="checkbox"/> Yes	29. Observation: <input type="checkbox"/> Observation in ED <input type="checkbox"/> No observation	30. Transfer to other facility: <input type="checkbox"/> Transfer <input type="checkbox"/> No transfer	31. Discharged: <input type="checkbox"/> Not discharged <input type="checkbox"/> Discharged <input type="checkbox"/> Left against medical advice <input type="checkbox"/> Left without being seen by EP <input type="checkbox"/> Left after being seen, before treatment	32. Death: <input type="checkbox"/> DOA <input type="checkbox"/> Died in ED <input type="checkbox"/> Alive		
Time Evaluation						
33. Transportation: <input type="checkbox"/> Ambulance <input type="checkbox"/> Police <input type="checkbox"/> Own transport <input type="checkbox"/> Walk <input type="checkbox"/> Family/Friends <input type="checkbox"/> Unknown	34. Time call EMS: 35. Time EMS arrival:	36. Time of presentation at ED: 37. Time when physician is seen:	38. Time of diagnostics: <input type="checkbox"/> Laboratory: <input type="checkbox"/> Imaging: <input type="checkbox"/> Other	39. Time at disposition/outcome:	40. TOTAL TIME IN ED:	

References

1. Perrott CA (2003) Emergency medicine in South Africa: a personal perspective. *J Emerg Med* 25(3):325–328
 2. Gottschalk SB, Wood D, DeVries S, Wallis LA, Bruijns S, Cape Triage Group (2006) The Cape Triage Score: a new triage system in South Africa. Proposal from the Cape Triage Group. *Emerg Med J* 23:149–153
 3. Dickinson G (1999) African drumbeats: a first conference on emergency medicine. *CJEM* 1:44–46
 4. Balfour C (2006) Emergency medicine—a new era in South African medicine. *S Afr Med J* 96:47–48
 5. MacFarlane C, Loggerenberg C, Kloeck W (2005) International EMS systems: South Africa—past, present, and future. *Resuscitation* 64:145–158
 6. Wallis LA, Twomey M (2007) Workload and casemix in Cape Town emergency departments. *S Afr Med J* 97:1276–1280
 7. Hodgkinson PW, Wallis LA (2009) Cross-sectional survey of patients presenting to a South African urban emergency centre. *Emerg Med J* 26:635–640
 8. Website of the South African Triage Group. Available via: www.triagesa.co.za. Accessed 1 Nov 2009
 9. de Vries GMJ, Luitse JSK (2001) Emergency medicine in the Netherlands. *Ann Emerg Med* 38:583–587
 10. Burt CW, McCaig LF, Valverde RH (2006) Analysis of ambulance transports and diversions among US emergency departments. *Ann Emerg Med* 47:317–326
 11. Nawar EW, Niska RW (2007). National Hospital Ambulatory Medical Care Survey: 2005 Emergency Department Summary. Advanced Data from vital and health statistics No 386.
 12. MRC South Africa (2005). A profile of fatal injuries in South Africa. National injury mortality surveillance system 2005; Section 4: Cape Town Metropolitan Area
 13. WHO statistical information system. Available via: <http://www.who.int/whosis/en/index.html>. Accessed 1 Nov 2009
- Rens Hanewinkel** is a medical student at the Erasmus University in Rotterdam, The Netherlands. This research was performed in order to accomplish his doctorate degree. Supervision was given by Professor Lee Wallis from the University of Cape Town & Stellenbosch, South Africa and by Professor Terrence Mulligan from the University of Utrecht, The Netherlands.
- Henri P. Jongman** is a medical student at the Erasmus University in Rotterdam, The Netherlands. This research was performed in order to accomplish his doctorate degree. Supervision was given by Professor Lee Wallis from the University of Cape Town & Stellenbosch, South Africa and by Professor Terrence Mulligan from the University of Utrecht, The Netherlands.
- Lee A. Wallis** is professor of Emergency Medicine at the University of Cape Town and Stellenbosch University, and head of Emergency Medicine for the Provincial Government of the Western Cape. He is president of the Emergency Medicine Society of South Africa, and of the newly formed African Federation for Emergency Medicine.
- Terrence M. Mulligan** is the Director of the Emergency Medicine Residency and the co-director of the Emergency Department at Universitair Medisch Centrum Utrecht, in Utrecht, The Netherlands since September 2009, where he is working on his PhD in International Emergency Medicine Development. From 2006–2009, Dr. Mulligan was the Director of the Emergency Department and the Director of the Emergency Medicine Residency at Erasmus Medical Center in Rotterdam, The Netherlands. Dr. Mulligan is also currently a faculty member and a clinical assistant professor at University of Maryland School of Medicine Department of Emergency Medicine since February 2006, where he is active in the International Emergency Medicine program and Fellowship.