After hours case mix at George provincial hospital emergency centre: a descriptive study

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Declaration

"I, the undersigned, hereby declare that the work contained in this assignment is my original work and that I have not previously submitted it, in its entirety or in part, at any university for a degree."

Signature: Date: 28 October 2011

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Abstract:

Introduction: Emergency care of patients in South Africa has become a priority, with the establishment of emergency medicine as a specialty, developing a triage scoring system, and upgrading facilities and services. The Western Cape Comprehensive Service Plan stipulates that ninety percent of health care should be offered at level 1 (primary and district) health care, eight percent at level 2 (general specialist) care, and two percent at level 3 (super specialist) care. It is suspected that a significant proportion of primary health care patients are presenting after hours to level 2 facilities, like George hospital. Little is known about the nature or acuity levels of patients presenting after hours to the George provincial hospital Emergency Centre. A retrospective descriptive study was performed at George hospital in May 2010 to determine the afterhours case mix and workload.

Methods: A total of 2560 patients presented afterhours at the emergency centre for the month of May 2010 that was triaged according to the Cape Triage Score (CTS). The case mix was analyzed according to a pre designed Microsoft Excel data sheet.

Results: Three quarters of the case mix were adults and 25% were paediatric cases. Sixty five percent of patients were triaged green, followed by twenty seven percent yellow, five percent orange and two percent red (one percent absconded before doctors evaluation). Besides trauma related cases, respiratory and gastrointestinal problems were the most common presentations. The workload included on average fifty four patients per afterhours weekday, one hundred and thirty eight patients per 24-hour weekend days and one hundred and forty seven for the public holiday.

Discussion: This study demonstrated that a significant number of the afterhours case mix presenting at George provincial hospital emergency centre consists of green and yellow level 1 cases which could be more appropriately managed at a level 1 health care facility.

Introduction

In South Africa, public hospital emergency centres provide acute health care for about 80% of the population.[1] These centres carry a large volume of patients presenting with various levels of severity of illness. Simultaneously, the primary health care (PHC) system is seen as the vehicle by which 90% of all health care should be delivered, including acute (or emergency) care. [2]

The overburdening of emergency centres by patients presenting with various levels of severity (acuity) of illness, in the context of nursing and medical staff shortages, has prompted the need to determine the type of patients presenting to a health system, particularly relating to acuity levels and specific diagnoses (case mix).[3]

This is especially true for afterhours services, where nursing and medical staff are less, in comparison with day shifts. In George hospital this has been identified as an area of concern. The afterhours case mix is one of the parameters considered in patient classification systems that are designed to serve as guidelines for allocation of nursing and medical staff.

In an attempt to address acuity levels and prioritizing of patients with emergencies, the Cape Triage Score (CTS) has been developed by the Cape Triage Group (CTG) for use in emergency centres throughout South Africa.[4] The CTS has three versions: for adults (≥13 years), children (3 years to 12 years) and infants (<3 years) and is colour coded as follows (Table 1): [4]

Colour	**Priority**	**Waiting time to see doctor**
Red	Immediate	nil
Orange	very urgent	less than 10 min
Yellow	Urgent	less than 60min
Green	Routine	less than 240min
Blue	Dead	

Table 1: Cape Triage Score priority colour coding

The Western Cape has developed policies and standards around resource allocation and management of patients with different acuity levels in emergency centres.[5] For example, it is

accepted that a clinical nurse practitioner could attend to green-coded patients, while a senior doctor would be necessary for orange or red-coded patients. Patients' triaged green will take on average 15-20 minutes to manage, while patients triaged orange or red will take closer to an hour to manage. This has implications for staff compositions and ratios, funding of such posts, and quality of patient care.

Little is known about the patient pathology, and specifically, the acuity levels of patients presenting to emergency centres in South Africa. No research about this issue has been undertaken in the Eden and Central Karoo districts.

The population growth rate of George was 4.6% per annum between 1996 and 2001.[6] Poverty in the region is a harsh reality, with a large number of the population aged between 15-65 years, unemployed and without a flush or chemical toilet.[6] The number of households in George with no income has increased by 470% over the last 5 years.[6] The demand for healthcare by the indigent is high and is further increased by the constant influx of patients from the Eastern Cape, which cannot be quantified at this stage. There is a growing number of patients from other African countries, who place an additional burden on the already stretched resources for healthcare in this area.

George hospital is a regional hospital providing level 1 (PHC and district) care to the population of George, and level 2 (general specialist) care to the population of the Eden (455 000) and Central Karoo (57 000) districts in the Western Cape.[7] The population of the area totals about 512 000 of which about 140 000 are living in George.[7] The emergency centre manages about 130 patients per 24 hours, with about 60% of patients seen during the dayshift(08h00 to 17h00) and 40% afterhours (17h00-08h00 weekdays, and all hours on weekends and public holidays) (personal communication from unpublished hospital statistics).

Ten primary health care facilities and a few mobile clinics service the broader George area and are situated within a 10km radius from the hospital. The George sub-district has no district hospital, and the community healthcare facilities offer no afterhours services. Clinic hours are from 07h30 to 16h30, Mondays to Fridays.

Therefore, everyone requiring health care after hours, on weekends, and on public holidays, who cannot afford private care, has to access the emergency centre at George hospital.

Literature review

Emergency centres (ECs) in South Africa deal first hand with the quadruple burden of disease, namely maternal and child health diseases, non-communicable chronic diseases, violence and injuries, and HIV/AIDS and TB.[1] Primary healthcare facilities are often poorly resourced, understaffed and overcrowded, resulting in patients seeking healthcare at hospital ECs. The resulting overcrowding of ECs leads to prolonged waiting times and potentially increases morbidity and mortality. Subsequently the Cape Triage Score (CTS) was developed to maximise the efficient use of resources and to minimise risk to patients. The CTS was implemented in the Western Cape on 1 January 2006.[4]

Local research has shown that introduction of nurse triage, using the CTS, resulted in a reduction in waiting time in the EC in all but the lowest priority patients (green) from 237 min to 146 min ($p<0.001$). [8] Patients triaged "red" (highest priority) demonstrated a mean reduction in waiting time from 216 min to 38 min ($p<0.001$). [8]

With EC triage, patients with problems that are more likely to require primary care could be identified and addressed at a more appropriate level of care.[8] In the United Kingdom (UK) two studies conducted in EC's demonstrated independently that 49% and 66% of EC attendees were triaged as presenting with primary care problems, in whom a delay in management was considered acceptable. [9] Another study in the UK has found that between 10% and 30% of EC attendees could be classified as primary health care cases.[10] Additionally, ongoing UK hospital audits have shown that primary care clinicians managed 27% of overall attendances to ECs.[10]

Little is known about the nature of patients presenting to the ECs in South Africa and only a few studies have been undertaken in this field.[11] Accurate service delivery planning requires sound understanding of the workload of ECs and the level of severity (acuteness) of patient illnesses (the case mix).[11] Case mix is described by a combination of the triage level, final diagnosis, and the types of procedures or investigations performed. The ECs typical workload is divided among emergency, urgent and routine (PHC) cases.[11] Furthermore, the literature reveals clear, predictable peaks of attendance, which should be matched by staffing levels.[11]

Locally, in a secondary level hospital (Paarl) a study has revealed that 81% of adults and 82% of children were triaged as less serious cases (green and yellow).[12] In addition, 82% of self referred patients were also triaged as yellow or green cases.[12] Evidently a large number of

low-acuity patients, largely self-referred, are being seen in the EC and could be managed by primary health care level staff outside the EC.[13]

Trauma centres in South Africa are described as level I to IV where I refers to a major trauma centre and IV to a primary care provider that provides basic trauma life support before patients are transferred for definitive care.[14] Approximately 33% of South African EC admissions are injury related, in comparison to 12% in the United States of America and eight percent in the UK.[13] Since it is such a large component of the emergency workload at most public hospitals in this country, staff must be well trained in emergency care.[11-13]

The aim of this study was to evaluate the patients presenting afterhours at the George hospital emergency centre. The objectives were to describe the case mix presenting at George hospital emergency centre after hours, to identify the afterhours workload and to determine the need for an afterhours primary health care facility.

Methodology

Setting

George hospital emergency centre is a referral centre for all the hospitals in the Eden and Central-Karoo districts. The regional hospital has 260 beds and provides level 1 (PHC and district) care and level 2 (general specialist) health care to the largely uninsured population in George and the surrounding geographical area. Patients were categorized as level 1 or level 2 depending on the main diagnosis, special investigations or procedures required, specialist care, and whether they were admitted or not.

The four nursing staff members afterhours have the responsibilities of triaging, assisting the two medical practitioners, four hourly observations, dispensing medication for the ten bed overnight ward and seeing to the patient needs, accompanying ill patients to the admission wards, be available for assisting with resuscitations, staffing the pharmacy for the discharged patients, as well as overseeing children for rehydration trials and helping in other wards when the need arises.

The one medical officer and one intern working afterhours carry the responsibility of managing the presenting caseload as well as overseeing the EC overnight 10 bed ward, assisting in theatre, and seeing to the family medicine patients in the wards as required.

All personnel in the EC have received formal training in using the Cape Triage Scoring System (CTS) for triaging. All nurses and doctors in the EC follow the CTS and enter the triage scores, evaluation times and clinical data in a consistent way in predesigned EC clinical notes. The CTS data at all hospitals in the Western Cape is audited monthly by a Triage group in Cape Town.

Design

This was a retrospective descriptive study.

Study population and study sample

Every patient accessing George hospital EC after hours (17h00-08h00 weekdays, and all hours on weekends and public holidays) for the period of 1 to 31 May 2010, was included. The time of triage was used to determine if they presented after hours or not. A sample of 2560 was obtained.

The EC patient register was used to identify the patients that presented after hours and their medical records were then retrieved. Patients who were dead on arrival were excluded. If the medical record was missing then these patients could not be included in the study.

Data collection

A standardized data collection sheet with predesigned data categories (Addendum A) was used to collect data from the medical records.

Data analysis

MS Excel was used to capture the data. Analysis was performed using Statistica Version 8 by the Centre for Statistical Consultation at Stellenbosch University. Descriptive statistics such as frequencies and means were used to present the results and histograms to demonstrate the spread of data.

Ethical considerations

Ethical approval for the study was obtained from the University of Stellenbosch, Health Research Ethics Committee (Ref. no. N10/05/170) and George Hospital Management (Dr M Viljoen). Patient confidentiality was maintained, as all data collected from patient's files were coded and detached from patient names. A waiver of informed consent was granted by the ethics committee.

Results

A total of 2560 patients were triaged according to the Cape Triage Score during the month of May 2010. Of the 2560 patients triaged, 5 files had missing notes and 33 patients absconded before being evaluated by the EC doctor. There were fifteen deaths of patients seen in the emergency centre for the month of May 2010 of which six occurred after hours.

Of those triaged, 74.2% were adults (≥13years), 8.4% children (3 years to 12years) with a mean age of one year (SD 0.6) and 17.4% children and infants (<3years) with a mean age of six months (SD 2.9), collectively referred to as infants, as shown in Figure1.

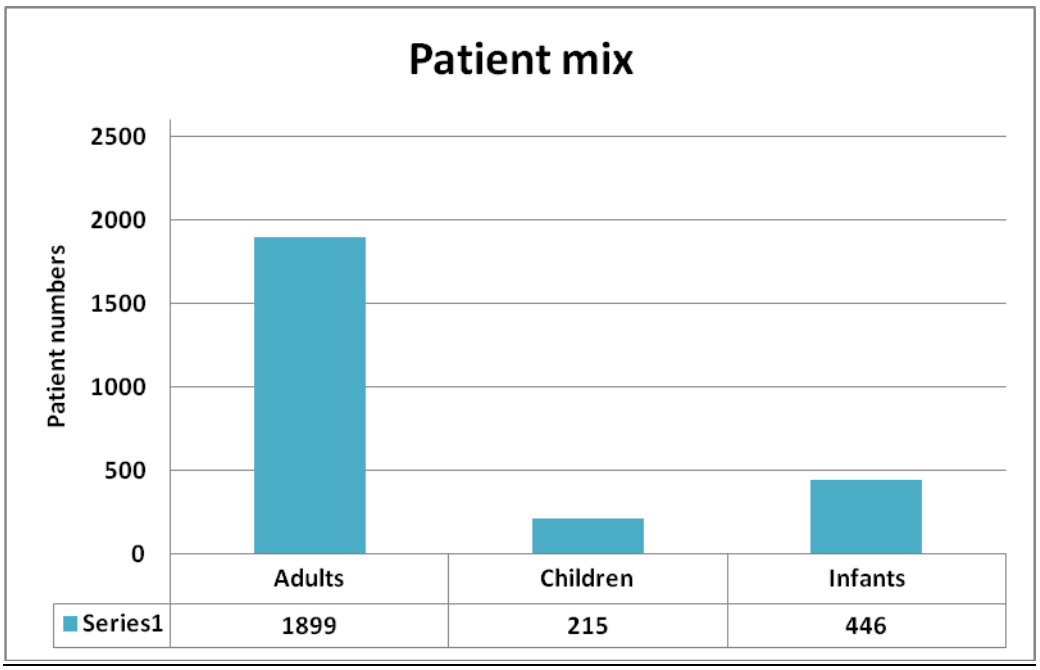

Figure 1: Total patient case load (N=2560)

Green cases amounted to 1665 (65%) of the total, yellow cases to 678 (27%), orange to 127 (5%), red to 50 (2%) and 1% had no data, as shown in Figure 2.

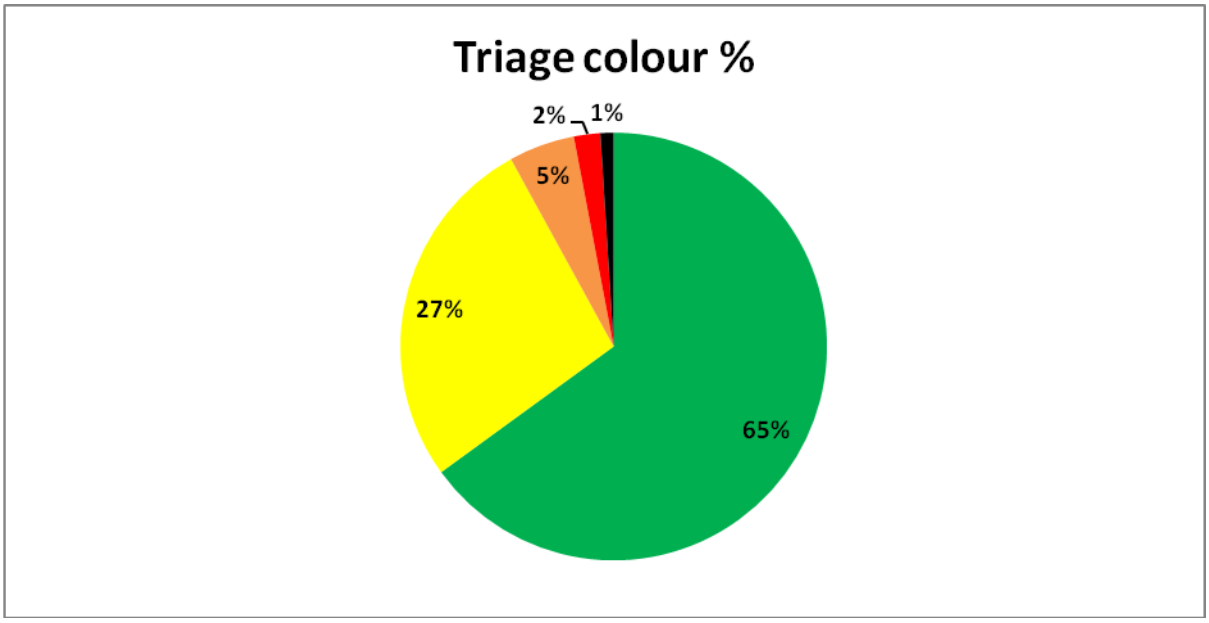

Figure 2: Cape Triage Score prioritization/degree of urgency

Green cases: n=1665 (65%)

Table 2 summarises the main findings. The majority of green cases were adults 1207(73%), followed by children 151(9%) and infants 307(18%). The most common presentations amongst the adults were related to trauma (32%), followed by gastrointestinal complaints (11%) and respiratory complaints (8%).

In children almost the same trend was observed with trauma being the most common presentations (22%), followed by respiratory complaints (20%), and then gastrointestinal complaints (13%).

On the contrary, the most common presentations in infants were gastrointestinal (39%), followed by respiratory complaints (30%) and trauma related injuries (5%).

The main diagnoses made in adults were injury related, followed by gastritis, lower respiratory tract infection (LRTI) and tuberculosis. In children the main diagnoses were injury related, followed by LRTI, then gastroenteritis. In infants however, the main diagnoses was gastroenteritis followed by LRTI.

Investigations were performed on 14% of the green level 1 case mix and on 46% of the green level 2 case mix (including trauma related cases). 1399 (84%) green patients were discharged, and 266 (16%) were admitted.

	Most Common Presentation	n (%)	Main Diagnosis
Adults n=1207(73%)	Trauma	384(32)	Injury related
	Gastrointestinal	137(11)	Gastritis/gastroenteritis
	Respiratory.	96(8)	Tuberculosis/Lower respiratory infection
	Forensic	91(8)	
	Other	499(41)	
Children n=151 (9%)	Trauma	33(22)	Injury related
	Respiratory	30(20)	Lower respiratory infection
	Gastrointestinal	20(13)	Gastroenteritis
	Other	68(45)	
Infants n=307 (18%)	Gastrointestinal	119(39)	Gastroenteritis
	Respiratory	91(30)	Lower respiratory infection
	Trauma	17(5)	Other
	Other	80(26)	

Table 2. Presentations and main diagnosis of green patients (N=1665 (65%))

Of the total patients triaged (n=2560) green patients that required level 1 care were 987(39%) and green patients that required level 2 care were 678(26%) as shown in Figure 3.

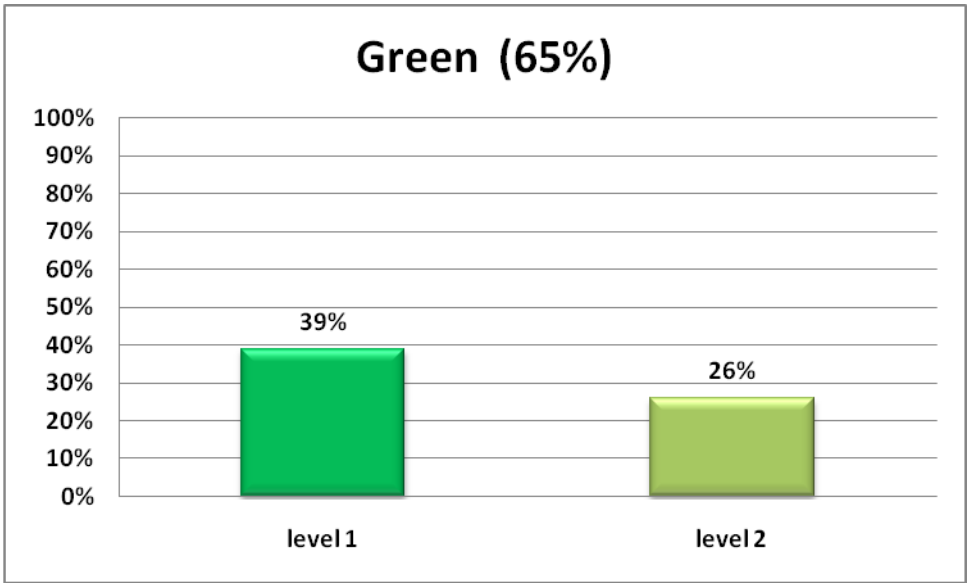

Figure 3: Level of care required in green patients as a % of all patients triaged

Yellow cases: n=678 (27%)

Table 3 summarises the main findings. The majority were adults 531 (78%), followed by children 53 (8%) and infants 94 (14%).

The most common presentation amongst the adults was trauma related (34%) followed by respiratory (21%) and gastrointestinal (8%) complaints.

In children the most common presentation was respiratory (36%), trauma related (26%) and gastrointestinal (10%) complaints.

Infants most commonly presented with respiratory complaints (46%) followed by gastrointestinal (36%) complaints.

The main diagnosis in adults was injury related followed by lower respiratory tract infection, tuberculosis and gastroenteritis.

In children lower respiratory tract infection was the main diagnosis followed by injury related and then gastroenteritis.

Pneumonia followed by gastroenteritis was the main diagnosis in infants.

Investigations were performed on 12% of the yellow level 1 group and on 46% of the yellow level 2 group. 345 (51%) yellow patients required admission and 333(49%) were discharged.

	Most Common Presentation	n(%)	Main Diagnosis
Adults n=513(78)	Trauma	182(34)	Injury related
	Respiratory.	111(21)	Tuberculosis/Lower respiratory infection
	Gastrointestinal	42(8)	gastroenteritis
	Neurology	31(6)	Epilepsy
	Other	165(31)	
Children n= 53(8)	Respiratory	19(36)	Lower respiratory infection
	Gastrointestinal	5(10)	Gastroenteritis
	Trauma	14(26)	Injury related
	Other	15(28)	
Infants n=94(14)	Respiratory	43(46)	Pneumonia/Lower respiratory infection
	Gastrointestinal	34(36)	Gastroenteritis
	Other	18(18)	

Table 3. Presentations and main diagnosis of yellow patients (N=678 (27%))

Orange cases: n=127 (5%)

Adults amounted to 85 (67%), children to 9 (7%) and infants to 33 (26%).

The most common presentation amongst the adults was trauma related (25%) followed by cardiovascular (12%) then respiratory (10%) complaints.

Children mostly presented with respiratory complaints (45%) then trauma related (33%) complaints.

The majority of infants presented with respiratory (46%) and gastrointestinal (42%) complaints.

The main diagnosis in adults was injury related followed by myocardial infarcts or angina, then pneumonia and tuberculosis.

In children the main diagnosis was lower respiratory tract infections followed by injury related diagnosis.

The main diagnosis in infants was pneumonia followed by gastroenteritis.

29 (23%) of orange triaged patients required level 1 care and 98 (77%) required level 2 care.

Of the total orange triaged, 89 patients (70%) were admitted and 38 (30%) were discharged.

Red cases: n=50 (2%)

Adults amounted to 39 (78%), children 0 and infants 11 (22%).

The most common emergencies amongst the adults were medical conditions followed by surgical, and the majority of infants presented with respiratory emergencies.

Investigations were performed on all but four cases.

46(92%) patients required admission and 4(8%) patients were discharged.

Level of care

Of the total triaged (N=2560) 47% required level 1 care and 52% level 2 care.

Green level 1 cases were 987 (39%) and green level 2 cases amounted to 678(26%)

Yellow level 1 cases were 174 (7%) and yellow level 2 cases were 504 (20 %).

Orange and red level 1 was 42(1%). (See Fig. 4)

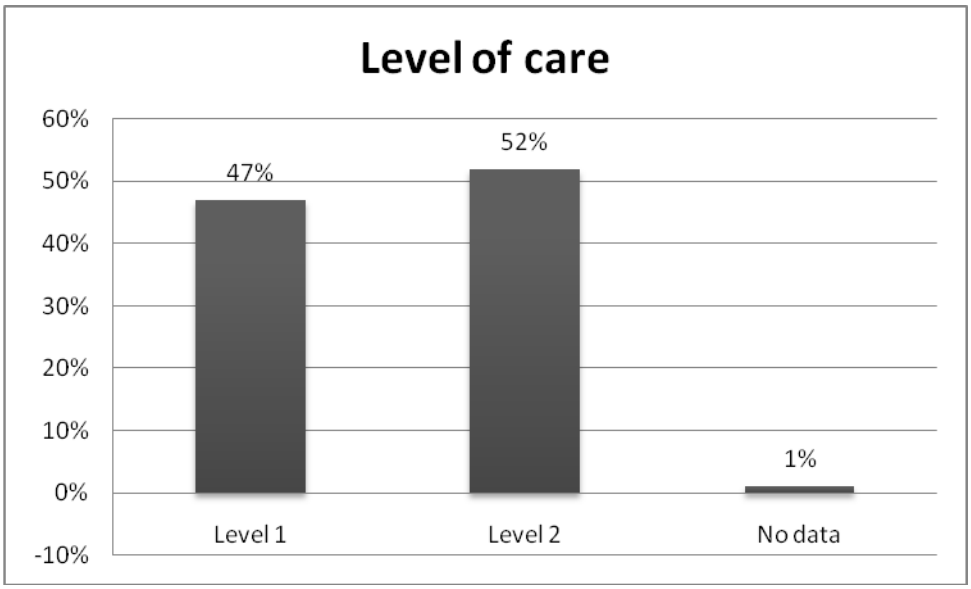

Figure 4: Level of care required of the total triaged (N=2560)

Workload

The workload included on average 54 patients after hours on a weekday, 138 patients per day on the weekend and 147 per day on the public holiday. The average time spent per patient on weekdays afterhours according to triage colour and level of care is summarized in table 4. (1% missing data)

After hours medical staff coverage during week days was one medical officer (MO) and one intern (junior doctor) and on weekends two medical officers (most of the time) and one intern, in contrast to three MO's and 1 intern during office hours.

Four nursing staff members were allocated per week and weekend night shift, with seven to eight on a day shift (including weekends).

The observed peak times on week days were from 16h00 to 22h00, and over weekends and the public holiday from 13h00 to 24h00.

Triage colour and average time/patient	**Level 1 patients n=25 (47%)**	**Time in minutes (hours)**	**Level 2 patients n=28 (52%)**	**Time in minutes (hours)**	**Total patient hours/shift**
Green: 20 minutes	21	420 (7)	14	280 (4.7)	11.7
Yellow: 30 minutes	3	90 (1.5)	11	330 (5.5)	7
Orange + Red: 60 minutes	1	60 (1)	3	180 (3)	4
		(9.5)		(13.3)	**23**

Table 4. Workload afterhours on weekdays: 5pm-8am (15 hours) (N=53)

The average time spent per patient on weekends (24 hours) according to triage colour and level of care is summarized in table 5. (1% missing data)

Triage colour and average time/patient	**Level 1 patients n=65 (47%)**	**Time in minutes (hours)**	**Level 2 patients n=72 (52%)**	**Time in minutes (hours)**	**Total patient hours/shift**
Green: 20 minutes	54	1080 (18)	36	720 (12)	30
Yellow: 30 minutes	10	300 (5)	28	840 (14)	19
Orange + Red: 60 minutes	1	60 (1)	8	480 (8)	9
		(24)		(34)	**58**

Table 5. Workload afterhours on weekends: 24 hours (N=137)

Discussion

Three quarter of the patients were adults (74.2%) followed by infants (17.4%) and children (8.4%). The majority of patients were triaged green (65%) followed by yellow (27%), orange and red. This is in keeping with other South African studies.[11-13]

The main diagnoses among green patients in adults were trauma, followed by gastritis, lower respiratory tract infection and tuberculosis. In children the main diagnoses were trauma, followed by lower respiratory tract infection, then gastroenteritis. In infants however, the main diagnoses was gastroenteritis followed by lower respiratory tract infection. This correlates with what is experienced nationally in South Africa. [1,3]

The afterhours workload was identified as 23 hours per 15-hour weekday shift, and 58 hours per 24-hour weekend shift. Staffing included two doctors and four nurses per afterhours weekday shift, and three doctors and seven (day) and four (night) nurses per weekend shift.

By comparison, Paarl hospital, which serves the same number of patients per annum as George hospital (46000) has three medical officers and nine nursing staff per afterhours shift servicing only the EC. (Personal communication with the head of the EC, Paarl Hospital)

Looking at international staff ratios according to acuity levels of patients, the local staffing seems reasonable[17]. However, workload is a multidimensional concept that must incorporate all the activities doctors and nurses need to perform in the emergency centre, including "mental workload". [18]

47% of patients that were triaged required level 1 care. This translated to level 1 green patients needing 7 hours of attention per afterhours week shift and 18 hours of attention per weekend shift. Level 1 yellow patients needed 1.5 hours of attention per afterhours week shift and 5 hours of attention per weekend shift. These level 1 green and yellow triaged patients are currently managed at the level 2 emergency centre, and could be managed more efficiently at a level 1 facility by a PHC doctor and/or a clinical nurse practitioner. Subsequently, the need for an after hours primary healthcare facility for level 1 patients was identified as 8.5 hours per shift during weekdays and 23 hours per weekend shift. This need could be addressed by establishing a PHC facility outside the level 2 emergency centre (probably preferred) or inside the level 2 emergency centre, even as a "fast track" area to deal with low-acuity patients.[17]

Primary healthcare facilities for the George population are currently available for only 24% of the week. Some of the consequences of level 1 patients inappropriately being managed at a higher level of care include congestion of the emergency centre, delayed treatment of level 2 and more acute patients, conflict in the waiting areas, and increased pressure on resources.

Recently, the Health Minister of South Africa, Dr Aaron Motsoaledi, has called for more emphasis to be placed on Primary Health Care as part of reducing the huge burden of disease the country is facing. He also expressed his concern for the curative nature of the South Africa`s healthcare system, describing it as hugely expensive and unsustainable.[19]

Dr Motsoaledi stated that primary health care in South Africa is severely under-used as people seemed to prefer hospitals to clinics. "Going to a hospital instead of a clinic had become the norm in South Africa, and it was crippling the country's health system. This practice is not normal," said the Minister.[19]

Study limitations:

This was a retrospective, descriptive study and not necessarily generalisable. The emergency centre patient register is completed by the nursing staff and the files were drawn according to the recorded triage time by the nursing personnel and the doctor's notes. There is a chance of data entry error.

Recommendations

An afterhours level one health facility is needed for the George sub-district, in- or outside the hospital. Research into the patient specific reasons for accessing a higher level of care than required is needed.

Conclusion

The aim of this study was to determine the afterhours case mix at George Hospital emergency centre, which showed that 39% of patients were green level 1 and 7% were yellow level 1 cases. The afterhours workload was also established. Level one patients can be more appropriately managed at a level 1 (PHC) health care facility.

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Addendum A : Data Collection Tool

Confidential Information/ General characteristics

File Number:	Age:	Date of visit:

Cape Triage Score

☐ Green ☐ Yellow ☐ Orange ☐ Red

Presenting Complaints

☐ Trauma related ☐ Nervous system ☐ Skin ☐ Overdose ☐ Other

☐ Respiratory ☐ GIT ☐ Drunk driver ☐ Gen Weakness

☐ Cardiovascular ☐ Psychiatric ☐ Sexual Assault ☐ Systemic/Metabolic

Main Diagnosis

Trauma:

☐ Injury related ☐ Surgical

Cardiac:

☐ Angina/MI ☐ Collapse ☐ Other

☐ Hypertension ☐ Heart failure

Internal Medicine:

☐ DM Related ☐ HIV ☐ Drugs

☐ Abdominal ☐ Oncological ☐ Other

Neurologic:

☐ Epilepsy ☐ Peripheral ☐ Other

☐ Dizziness ☐ CVA

Respiratory:

☐ Asthma/COPD ☐ Pneumonia ☐ Other

☐ TB ☐ LRTI

Obstetric/Gyne/Urology

☐ Vaginal bleeding ☐ STD ☐ Other

☐ Miscarriage ☐ Ectopic

Investigations

☐ Bloods ☐ X-rays ☐ U/S or CT Scan ☐ Other

Referrals

☐ No ☐ Yes Department:

Discharged

☐ Yes ☐ No ☐ Overnight ☐ Admit

Level of Care

☐ 1 ☐ 2

Died:

☐ Died in ED ☐ Alive