

The after-hours case mix of patients attending the George Provincial Hospital Emergency Centre

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Background: The emergency care of patients in South Africa has improved with the establishment of Emergency and Family Medicine as specialities, the introduction of the Cape Triage Scoring (CTS), and the upgrading of emergency care services. The Western Cape Comprehensive Service Plan stipulates that 90% of care should be delivered through primary and district (level 1) services, 8% through general specialist (level 2) services and 2% through super-specialist (level 3) services. Many patients needing level 1 care present after hours at level 2 facilities. This study was undertaken to determine the after-hours emergency centre case mix and workload at George Provincial Hospital Emergency Centre.

Method: This was a descriptive retrospective study. Using the CTS, emergency centre staff triaged 2 560 patients who presented for care after hours in May 2010. The data were entered and analysed in MS Excel[®]. The case mix and workload were then determined.

Results: Adults comprised 75% of the case mix. Sixty-five per cent of patients had routine (CTS “green”) complaints, 27% had urgent (CTS “yellow”) complaints, 5% had very urgent complaints (CTS “orange”) and 2% needed immediate care (CTS “red”). Trauma, respiratory and gastrointestinal problems were the most common presentations. The workload during the study period from 1–31 May 2010 included 54 patients after hours on weekdays, 138 patients per 24-hour (08h00–08h00) weekend days and 147 on public holidays.

Conclusion: This study showed that 47% of patients who presented after hours at the George Provincial Hospital Emergency Centre required primary or level 1 care. These patients could be more appropriately managed at a level 1 facility.

Keywords: after-hours care, emergency service, hospital, nurse practitioner, triage

Introduction

Public hospital emergency centres in South Africa provide acute care for approximately 80% of the population.¹ Patients attend these centres in large numbers, with varying degrees of illness, much of which can be adequately dealt with at the primary level of care.²

In order to manage their work better in the face of staff shortages, emergency centre managers have analysed the pattern of patients attending their centre with regard to the severity and nature of the illness, i.e. the case mix.³ Such analysis helps managers to allocate staff appropriately, especially at night and over weekends and public holidays, when fewer numbers of staff are on duty. The need for such an analysis was identified at George Provincial Hospital. In 2006, the Cape Triage Group introduced the Cape Triage Score (CTS) system to help make the best use of resources and reduce risk to patients.⁴ The CTS has a version for patients over 13 years of age, another for patients aged 3–12 years and another for patients younger than 3 years.

Patients are assessed with respect to the severity of their illness and their priority is determined. They are then assigned a colour according to the gravity of their illness. This coding determines how long patients should wait to see the doctor, as shown in Table 1.

The Western Cape Health Department allocates staff and resources according to the level of need in hospital emergency centres.⁵ Patients whose illness is seen as routine (CTS “green”) could be seen by a clinical nurse practitioner for a consultation of 15–20 minutes duration, while a patient categorised as needing very urgent or immediate care (CTS “orange” and “red”) may need attention for an hour or more. This situation clearly has

implications for staff composition, the funding of posts and quality of care.

Little is known about the disease patterns of patients attending emergency centres in South Africa, and this is also true of the Eden and Central Karoo districts. The population of George is roughly 140 000 and growing at 4.6% per annum. It is an impoverished community. Many indigent people go to the hospital emergency centre when they are ill.⁶ Many of those in need of care originate from the Eastern Cape or other African countries.

George Provincial Hospital provides primary health care and district (level 1) care to the population of George and general specialist care (level 2) to the population of Eden (455 000) and Central Karoo (57 000) Districts in the Western Cape.⁷ Approximately 130 patients are seen at the emergency centre in a 24-hour period.

Sixty per cent of these patients are seen between 08h00 and 17h00 on weekdays, and 40% are seen between 17h00 and 08h00 on weekdays and over weekends or public holidays.

The George area is served by 10 primary healthcare clinics and a few mobile clinics within a 10 km radius of the hospital. Clinic hours are between 07h30 and 16h30 on weekdays. After-hours care is not offered. Consequently, patients who cannot afford private care and who are ill at night, weekends and on public holidays must attend the hospital emergency centre to receive care.

The context

Primary care facilities in South Africa are generally poorly resourced, understaffed, overcrowded, and open for limited hours. Thus, patients who could be managed at primary care level are often

Table 1: The Cape Triage Score, detailing the colour coding and patient waiting times

Colour	Priority	Waiting time to see the doctor
Red	Immediate	0 minutes
Orange	Very urgent	< 10 minutes
Yellow	Urgent	< 60 minutes
Green	Routine	< 240 minutes
Blue	Dead	

obliged to seek care from hospital emergency centres. The emergency centres are consequently often overburdened by primary care patients suffering a wide range of trauma, acute and chronic illness, as well as tuberculosis and human immunodeficiency virus and acquired immune deficiency syndrome. The resulting overcrowding of emergency centres results in long waiting times, which potentially increase morbidity and mortality.

Nurse triage of local patients in emergency centres using the CTS has been shown to reduce patient waiting times for patients. Patients requiring immediate care (CTS “red”) have been shown to experience a mean reduction in waiting time from 216 to 38 minutes, while patients requiring routine care (CTS “green”) benefitted from a mean reduction in waiting time from 237 to 146 minutes.⁸

Emergency centre triage allows patients with problems requiring primary level care to be identified.⁸ Two independent emergency centres studies in the UK showed that 49% and 66% of emergency centres attendees had conditions where delayed management would be appropriate.⁹ In another UK study, between 10% and 30% of emergency centres attendees had conditions requiring primary level care. Audits in a UK hospital demonstrated that primary care clinicians managed 27% of overall attendees at emergency centres.¹⁰

Little is known of the pattern of patients attending emergency centres in South Africa, as few studies have been undertaken here.¹¹ Wallis and Towmey showed that a significant proportion of the workload of community health emergency centres in Cape Town was emergency or urgent in nature, presented outside of normal office hours, involved a large paediatric case mix, and typically the patients self-presented.¹¹ The planning and delivery of emergency centre care requires an understanding of the level of severity of patient illness (acuteness) and of the workload, which involves the number, nature and time of patient presentations. Case mix is described as a combination of triage level, final diagnosis and the nature of the procedures and investigations undertaken. Typically, the workload of an emergency centre is divided between emergency, urgent and routine cases. Studies reveal predictable peaks of attendance to which staff levels should be matched.¹¹

In South Africa, trauma centres are graded from level I to level IV, where level I is a major trauma centre and level IV is a primary care facility providing basic life support before patients are referred for definitive care.¹⁴ Approximately 33% of emergency centre admissions in South Africa are injury related, while in the USA the figure is 12%, and 8% in the UK.¹³ Clearly, staff in South African emergency centres need to be well trained in trauma care.^{11–13}

The hospital

George Provincial Hospital, which has 260 beds, provides primary and district (level 1) care and general specialist (level 2) care to the largely uninsured population of George and surrounding areas. The hospital's emergency centre acts as the referral centre for all hospitals in the Eden and Central Karoo Districts. Patients are

assessed as needing level 1 or level 2 care in relation to their diagnosis, their need for investigations or procedures, their need for specialist care and whether or not they need admission to hospital.

The emergency centre is staffed by four nurses after hours. These nurses triage patients, assist doctors, dispense medicines, accompany patients to the wards, assist with resuscitation and help in other wards when necessary. A medical officer and an intern attend to patients, oversee the 10-bedded ward and assist in theatre, as required.

Staff members who work in the emergency department are trained to use the CTS and to enter triage scores and patient waiting times on a standard data-capture form. CTS data from hospitals in the Western Cape are audited regularly by a triage group in Cape Town.

Method

This retrospective descriptive study was conducted to describe the case mix of patients attending the George Provincial Hospital Emergency Centre after hours and to determine the after-hours workload.

Patients who attended the George Provincial Hospital Emergency Centre and who were triaged after hours from 1–31 May 2010 were included in the study. A total of 2 560 patients were recorded in the emergency centre patient register as having attended after hours during this period. Their medical records were retrieved and data extracted. Patients who were dead on arrival or whose records could not be traced were excluded from the study.

Patient details were recorded on a standard data-capture form. These data were then entered into an Microsoft® Excel® spreadsheet and analysed using Statistica® version 8 by the Centre for Statistical Consultation at Stellenbosch University.

Results

Altogether, 2 560 patients were triaged using the CTS. Of those triaged, there were incomplete files for five patients, 33 absconded before they could be seen by the doctor and six died. Of the triaged patients, 1 899 (74.2%) were adults, 215 (8.4%) children aged 3–12 years and 446 (17.4%) children younger than three years.

Patients triaged as needing routine care (code “green”) totalled 1 665 (65%), patients triaged as needing urgent care (code “yellow”) totalled 678 (27%), patients triaged as needing very urgent care (code “orange”) totalled 127 (5%), patients triaged needing immediate care (code “red”) amounted to 50 (2%) and no data were obtained for (25) 1% of the patients. Figure 1 shows the breakdown of patients triaged in May 2010 by colour code.

Patients triaged as needing routine care (CTS “green”)

The breakdown of the 1 665 (65%) “green” patients triaged as needing routine care (CTS “green”) were as follows: 73% were adults, 9% children and 18% infants.

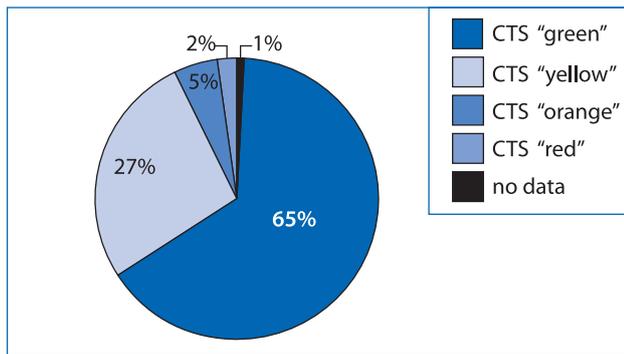


Figure 1: Patients triaged according to the Cape Triage Score (CTS) colour code

The most common presentations in both the adults and children were trauma related, followed by gastrointestinal and respiratory complaints. The most common presentations in infants were gastrointestinal complaints, followed by respiratory complaints and injuries.

The main diagnoses made with respect to the adults were injury related, followed by gastritis, lower respiratory tract infection and tuberculosis. The main diagnoses made with respect to children were injury related, followed by lower respiratory tract infection, then gastroenteritis. However, the main diagnosis made with regard to infants was gastroenteritis, followed by lower respiratory tract infection (Table 2).

Of the 1 665 patients triaged as routine (CTS code "green"), 987 (59%) required level 1 care and 137 (14%) investigation. A further 678 patients (41%) needed level 2 care, of whom 312 patients (46%) required investigation. Of patients triaged as needing routine care (CTS code "green"), 1 399 (84%) were discharged and 266 (16%) admitted.

Patients triaged as needing urgent care (CTS "yellow")

Seventy-eight per cent of patients triaged as needing urgent care (CTS "yellow") were adults, 8% were children and 14% infants. The most common cause for adults attending was trauma, followed by respiratory and gastrointestinal complaints. Children most commonly presented with respiratory complaints, followed by

trauma-related and gastrointestinal complaints. Infants presented with respiratory, followed by gastrointestinal complaints.

The main diagnosis made with respect to adults was injury related, followed by lower respiratory tract infection, tuberculosis and gastroenteritis. Lower respiratory tract infection was the main diagnosis in children, followed by injury-related diagnoses and then gastroenteritis. In infants, pneumonia was the main diagnosis, followed by gastroenteritis (Table 3).

Of all patients requiring urgent care (code "yellow"), 51% were admitted and 49% discharged without admission.

Patients triaged as needing very urgent care (CTS "orange")

Sixty-seven per cent of patients triaged as needing very urgent care (CTS "orange") were adults, 7% were children and 26% infants. Adults most commonly presented with trauma-related complaints, followed by cardiovascular and respiratory complaints. Forty-five per cent of children presented with respiratory complaints, followed by 33% with trauma-related complaints. Forty-five per cent of infants presented with respiratory, and 42% with gastrointestinal, complaints.

The most frequent diagnosis in adults was injury related, followed by myocardial infarction or angina, then pneumonia and tuberculosis. In children, the main diagnoses were lower respiratory tract infections, followed by injury-related conditions. The main diagnosis in infants was pneumonia, followed by gastroenteritis.

Of all patients triaged as needing very urgent care (CTS "orange"), 70% were admitted to hospital and 30% discharged without admission.

Patients triaged as needing immediate care (CTS code "red")

Adults comprised 78% and infants 22% of patients triaged as needing immediate care (CTS code "red"). There were no children in this category. Medical conditions constituted the most common emergency in adults, followed by surgical conditions, while infants mostly presented with respiratory emergencies. Investigations were performed on all but four cases. Ninety-two per cent of patients required hospital admission and 8% were discharged.

Table 2: Presentations and main diagnosis of routine patients (Cape Triage Score "green")

Patients	Most common presentation	n (%)	Main diagnosis
Adults n = 1 207 (73%)	Trauma	384 (23)	Injury related
	Gastrointestinal	137 (8)	Gastritis or gastroenteritis
	Respiratory	96 (6)	Tuberculosis or lower respiratory infection
	Forensic	91 (5.5)	
	Other	499 (30)	
Children n = 151 (9%)	Trauma	33 (2)	Injury related
	Respiratory	30 (2)	Lower respiratory infection
	Gastrointestinal	20 (1)	Gastroenteritis
	Other	68 (4)	
Infants n = 307 (18%)	Gastrointestinal	119 (7)	Gastroenteritis
	Respiratory	91 (5.5)	Lower respiratory infection
	Trauma	17 (1)	Other
	Other	80 (5)	

*: n = 1 665

Table 3: Presentation and main diagnosis of patients needing urgent attention (Cape Triage Score "yellow")*

Patients	Most common presentation	n (%)	Main diagnosis
Adults n = 513 (78)	Trauma	182 (27)	Injury related
	Respiratory	111 (16)	Tuberculosis or lower respiratory infection
	Gastrointestinal	42 (6)	Gastroenteritis
	Neurology	31 (5)	Epilepsy
	Other	165 (24)	
Children n = 53 (8)	Respiratory	19 (3)	Lower respiratory infection
	Gastrointestinal	5 (1)	Gastroenteritis
	Trauma	14 (2)	Injury related
	Other	14 (2)	
Infants n = 94 (14)	Respiratory	43 (6)	Pneumonia or lower respiratory infection
	Gastrointestinal	34 (5)	Gastroenteritis
	Other	18 (3)	

*: n = 678

Workload and level of care

Patients were defined as requiring level 2 care if they were admitted to the hospital, needed further investigations or procedures, or were consulted by a level 2 specialist from the hospital. Patients were defined as needing level 1 care if they were completely managed by the staff in the emergency centre without the need for any of the above. One medical officer and an intern provided after-hours cover in the emergency centre on weekdays, while two medical officers and an intern provided cover over weekends. The emergency centre was staffed by three medical officers and an intern during routine office hours.

Of the 2 560 patients triaged, 1 203 (47%) required primary (level 1) care, while 1 332 (52%) needed secondary (level 2) care (data were not obtained for 1%). Of those requiring level 1 care, 987 (39%) were coded CTS "green", 174 (7%) were coded CTS "yellow" and 42 (1%) were coded CTS "orange" and "red". Therefore, the triage colour did not always predict the eventual level of care required.

On average, 53 patients attended after hours on weekdays, which included four patients triaged as "orange" or "red". On average, 137 patients attended per day on weekends, which included nine patients triaged as "orange" or "red". On average, 147 patients attended per day on public holidays.

Four nurses were allocated to the emergency centre on weekday and weekend after-hours shifts, while 7-8 nurses were allocated on day and weekend shifts. Peak patient attendance was noted between 16h00 and 22h00 on weekdays, and between 13h00 and 24h00 on weekends and public holidays.

Table 4 and 5 show the average workload after hours on weekdays and weekends.

Discussion

Seventy-four per cent of patients triaged after hours in May 2010 were adults, followed by infants (17.4%) and children (8.4%). Sixty-five per cent of patients attended with routine complaints (CTS code "green"), while 27% needed urgent care (CTS code "yellow"). Less than 10% of patients needed very urgent or immediate care (CTS codes "orange" and "red", respectively). This pattern of attendance is in accordance with other South African studies.¹¹⁻¹³

The main diagnoses in CTS "green" adult patients 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 diagnosis was gastroenteritis, followed by lower respiratory tract infection. This correlates with what is experienced nationally in South Africa.¹⁻³

The after-hours workload was identified as 23 patient hours per 15-hour weekday shift, and 58 patient hours per 24-hour weekend shift. The emergency centre was staffed by two doctors and four nurses per after-hours weekday shift, and three doctors and seven nurses during the weekend daytime shift, and four nurses per weekend night-time shift. The staffing level at the George Provincial Hospital Emergency Centre compares well with international staff ratios according to the acuity levels of patients.¹⁵ However, a workload is a multidimensional concept that must incorporate all of the activities that doctors and nurses need to perform in the emergency centre, including "mental workload".¹⁶

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

Existing primary care facilities for the population of George are only open for nine hours a day during the week. Consequently, patients who are ill when the clinics are closed go to the hospital emergency centre for primary care. This pattern of attendance is inappropriate and results in congestion in the emergency centre, delays in the treatment of patients needing more urgent (level 2) care, avoidable conflict in the waiting areas and increased pressure on resources. Recent work performed in the same emergency centre found that 88.2% of emergency centre attendees were self-referred and 30.2% had complaints relating to conditions that had persisted for more than a month.¹⁸ The authors found that the attendance of only 4.7% of self-referred "green" patients was appropriate for the emergency centre. Patients cited the lack of primary healthcare services after hours as a compelling reason why they presented at the emergency centre.¹⁸

Nearly half of the patients attending the emergency centre needed primary (level 1) care. Those patients who were coded CTS "green" required a total of seven hours attention per weekday night-time shift and 18 hours of attention per weekend shift. Primary care patients needing more urgent care (CTS "yellow") required 1.5 hours of attention per weekday after-hours shift and five hours of attention

Table 4: Workload after hours on weekdays according to the Cape Triage Score colour and level of care

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 and red: 60 minutes	1	60 (1)	3	180 (3)	4
Total	25	570 (9.5)	28	790 (13.3)	23

Table 5: Workload after hours on weekends according to the Cape Triage Score colour and level of care per 24 hour-period

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 and red: 60 minutes	1	60 (1)	8	480 (8)	9
Total	65	1 440 (24)	72	2 040 (34)	58

per weekend shift. These patients are currently managed in a secondary (level 2) facility, while they could be managed by a doctor and/or a clinical nurse practitioner at a primary care facility (level 1). The need for an after-hours primary care facility (level 1) was determined as being 8.5 hours per shift during weekdays and 23 hours per weekend shift. This need for primary care could be met by a primary care facility outside the secondary hospital, or by a primary care unit attached to the emergency centre inside the hospital, or even as a dedicated fast-track area to deal with low-acuity patients.¹⁵

The South African Minister of Health, Dr Aaron Motsoaledi, recently stated that "going to a hospital, instead of a clinic, had become the norm in South Africa, and it is crippling the country's health system. This practice is not normal".¹⁷

Conclusion

This study was undertaken to determine the after-hours case mix at the George Provincial Hospital Emergency Centre. Forty-seven per cent of patients who attended the emergency centre needed primary care. These patients could be more appropriately managed in a primary care facility. These findings point to a clear need for a primary care facility to deliver after-hours care to the population of George. Such a facility could either be separate from the hospital, or incorporated with the emergency centre in such a way as to improve patient flow without impeding access to care by patients needing more urgent attention.

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