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The triage performance of emergency medical dispatch prioritisation compared to prehospital on-scene triage in the Western Cape Province of South Africa

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Abstract

Introduction The emergency medical service (EMS) response is dependent on the emergency medical dispatch (EMD) and the operations response team to ensure that the patient receives the required EMS resources and treatment in the appropriate time. EMS resources must be dispatched to calls of appropriate patient acuity. Overtriage and undertriage impact the appropriate response and optimization of EMS resources and, most importantly, patient outcomes. This study examines overtriage and undertriage rates in ambulance dispatch operations in the Western Cape Government (WCG), South Africa.

Aim Determine undertriage and overtriage rates of EMD priority allocation compared to on-scene ambulance triage.

Methods This was a retrospective descriptive study conducted with data received separately for dispatching emergency calls through computer-aided dispatch records and triage information from electronic patient care records. The data were derived from 1st October 2018 to 30th September 2019 and included primary response calls only. Using the South African Triage Scale, overtriage and undertriage of the priority rating of the incident at dispatch were calculated using the Cribari matrix for each incident type.

Results A total of 242,576 primary emergency responses were analysed. Overall, the overtriage rate was 62.28% (95% CI: 61.94%-62.63%), and the undertriage rate was 15.29% (95% CI: 15.10%-15.47%). The sensitivity was 53.71% (95% CI: 53.29%–54.13%), and the specificity was 74.31% (95% CI: 74.11%–74.51%). The incident types with the highest overtriage rates were obstetric (89%) and gynaecological (86%) complaints and allergic reactions (79%); while the incident types with the highest undertriage rates were respiratory complaints (31%), diabetes (30%), and chest pain (29%).

Conclusion This study revealed substantial overtriage and undertriage across all incident types. The results of this study provide a good reference point for future comparisons of triage rates in the Western Cape. It can be used to inform the development of policies, processes, guidelines, triage and training in dispatching systems, which may contribute to the optimization of prehospital resource management and patient care.

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Keyword Prehospital, Emergency medical service, Emergency dispatch, Low acuity, Triage, Ambulance dispatch

Introduction

In out-of-hospital emergency care systems, the emergency medical service (EMS) response to an emergency incident is dependent on the emergency medical dispatch (EMD) and the operations response team. The responsibility of the EMD is more than just receiving an emergency call from a member of the public and dispatching an emergency response to the caller. They are also required to identify the incident location, determine the acuity of the situation to dispatch the most suitable resource, provide prearrival instructions on bystander first aid interventions, stay in contact with the caller and provide support where possible until the arrival of the EMS team [1].

To ensure that patients receive the required EMS resources and treatment in a timely fashion, EMS resources must be dispatched to calls of appropriate patient acuity [2]. The most appropriate response also optimizes availability of EMS resources for other emergency calls and for patients who are experiencing genuine emergency needs [2]. This is important in resourced constrained systems. Very few countries have a formal EMS in place and therefore lack the capacity to respond, treat, and safely transport patients to hospital [3].

South Africa has a well-developed formal emergency care system, but across the country, EMS has a significant deficit in resources compared to current recommendations [4]. Inappropriate dispatch may send an emergency response for non-emergency cases (overtriage) or a delayed response for emergency cases (undertriage). Overtriage limits EMS resource availability and increases the risk of motor vehicle accidents with EMS resources, which endanger both EMS staff and members of the public [5]. Overtriage is not a new problem and affects many countries globally, including South Africa, where overtriage is reported to be as high as 93.5% [6]. Two studies conducted in South Africa indicated that 58% and 83% of patients who received an EMS response did not receive any medical intervention [6, 7].

Conversely, undertriage in the EMD delays the dispatching of emergency resources to cases of high urgency. Undertriage may result in delays in obtaining life-saving or definitive care in transporting patients to the hospital. The last study conducted in the Western Cape Government (WCG) measuring triage accuracy indicated, as part of its limitations, that overtriage rates were most likely decreasing; however, these trends were not assessed [8]. This study provides a triage performance analysis based on more recent data that provide a platform for comparison. The aim of this study was to determine the triage performance of EMD priority allocation compared to on-scene ambulance triage in the Western Cape of South Africa.

Methods

Setting

The WCG Department of Health provides EMS for a population of 7.21 million people [9]. In the province, 253 ambulances and 1 633 operational personnel attended 618,352 emergency cases during the 2021–2022 period [10]. Based on the national government's recommended ratio of 1/10 000 per capita, there was a shortage of 468 ambulances in the region. While the private EMS sector is available for emergency response, it primarily serves individuals with medical insurance, which accounts for only 18% of the population [11].

The WCG uses its own EMD system that is similar to a criteria based system (CBD) which allows for flexible call taking [8]. A CBD system, being flexible, identifies key information such as name, location, patient complaints and does not adhere to strict protocols [12]. When an emergency call is received by the EMD, it is handled by a call taker who prioritizes the call using a two-tier system: priority 1 (P1) or priority 2 (P2). The incident type is also selected through a prescribed set of options available to the call taker. The prioritization is assigned by the call taker based on the caller's description of the emergency and is guided by institutional policy or call taker experience [8]. A P1 patient is considered a higher priority and receives a more urgent dispatch from the EMD compared to the P2 patient [8]. The information is then transferred to the dispatcher, who dispatches the appropriate response for the call. The emergency response staff on the call treat and triage the patient red, orange, yellow, green or blue on the scene based on the South African Triage Scale (SATS), with red being the highest priority. The blue triage category is reserved for deceased patients [13].

Sample and sampling

This retrospective descriptive study was conducted with data from the WCG. The data files were received separately for dispatching emergency calls through computer-aided dispatching (CAD) records in the EMD and electronic patient care records (ePCR) from EMS operations. The data for this study were provided for the period from 1st October 2018 to 30th September 2019. The data included primary response calls only. This timeframe was purposefully chosen due to confounding factors of the COVID-19 pandemic and its related lockdown measures. The data files were obtained from the WCG for CAD and ePCR through Microsoft Excel® (Microsoft

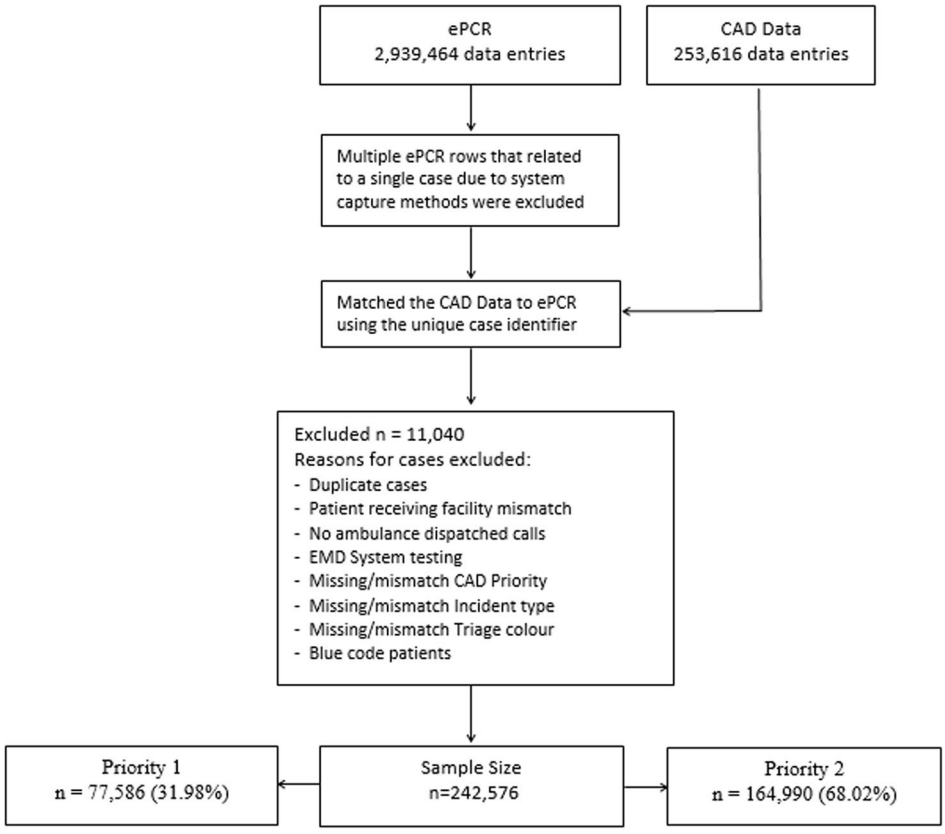

Fig. 1 Process flow of the data

Corp. Washington, United States) spreadsheets, which excluded patient identifiable information. Figure 1 illustrates the process of sampling.

Data extraction and definitions

All cases received through the EMD were matched with their respective ePCR using Stata (StataCorp. 2023. Stata Statistical Software: Release 18. College Station, TX: StataCorp LLC). Each row in the CAD data was thought of as a unique case with an identifier, and the ePCR records were added to CAD data based on this unique identifier. The ePCR data also consisted of multiple entries per unique identifier due to the way the data were recorded, which was the reason for the excessive discrepancy between datasets. To address the fact that multiple ePCR rows relate to a single case, the last row of the ePCR data was used when joining the two datasets. This matching allowed for comprehensive reviews of each patient, encompassing both dispatch and final on-scene information and enabling reliable comparative data.

If the EMD is accurate, emergency cases that are dispatched as P1 priority should be triaged as SATS red or orange codes. These are also regarded as cases of higher acuity. Patients who are in the triage categories of yellow or green should be dispatched as P2 priority because these are lower acuity patients. This dichotomization of triage was also used in other studies within the same setting [7, 8]. Consequently, overtriage was the proportion of patients who were triaged on scene by the treating EMS staff as yellow or green but were dispatched in the category of P1. Undertriage refers to the calls dispatched as P2 but are triaged red or orange.

Table 1 Dispatch priority vs. ePCR triage

Dispatch Priority		ePCR Patient Triage		
		Green/Yellow	Orange/Red	Total
P1	n	48,324	29,262	77,586
	Row %	62.3%	37.7%	100.0%
	Column %	25.7%	53.7%	32.0%
P2	n	139,771	25,219	164,990
	Row %	84.7%	15.3%	100.0%
	Column %	74.3%	46.3%	68.0%
Total	n	188,095	54,481	242,576
	Row %	77.5%	22.5%	100.0%
	Column %	100.0%	100.0%	100.0%

Data analysis

The data output in Stata was then further analysed using simple descriptive statistics through Microsoft Excel®.

Overtriage and undertriage are key factors in this comparison and are based on the Cribari Matrix (Table 1)

as well as false positive and false negative calculations, respectively [14]. Undertriage was also calculated using a modified Cribari Matrix which is recommended by another study [15]. The rationale for inclusion of this formula is that undertriage must consider those patients with severe injuries only and must not include any lower acuity cases. These lower acuity patients are not at risk of being undertriaged; therefore, the Cribari matrix provides a false sense of the truth [15]. Both formulas, Cribari Matrix and modified Cribari Matrix, were used for the calculation of undertriage and are reported separately. According to the American College of Surgeons Committee on Trauma (ACSCOT), undertriage rates < 5% and overtriage rates < 35% are considered acceptable [14, 16]. It should be noted, however, that these norms have not been validated outside of facility-based trauma populations in higher income settings but will be considered in this study because such norms do not exist for low-middle income countries. ASCOT is also specific to cases of trauma. Comprehensive guidelines for overtriage and undertriage in general medical patients especially in LMICs are not available [2, 17]. Diagnostic accuracy was also calculated in terms of sensitivity, specificity, and negative and positive predictive values. All the formulas for the calculations are reported in the Supplementary File.

This study was approved by the Human Research Ethics Committee of the University of Cape Town (HREC Ref 546/2019).

Results

A total of 253,616 primary responses were recorded over the 12-month period. After n = 11,040 exclusions were made, a final sample of n = 242,576 primary emergency responses were eligible for inclusion and analysis: comprising n = 77,586 (31.98%) P1 and n = 164,990 (68.02%) P2 responses (Figure 1). Cases that were excluded (11,040) often contained multiple reasons as listed and not just one.

Table 1 shows the number of P1 and P2 patients cross-tabulated with the triage category. Among all the emergency dispatches, n = 77,586 (31.98%) were P1, with n = 29,262 (37.72%) having high acuity (red and orange) and therefore triaged correctly. The majority of cases that were dispatched as P1 in the EMD resulted in the patient being green/yellow n = 48,324 (62.28%) and therefore overtriaged. Conversely, there were n = 139,771 (84.71%) P2 dispatched cases resulting in green/yellow triage with and 25,219 (15.29%) being orange/red indicating undertriage.

Table 2 reports the triage performance of EMD prioritization. Overall, the rate of overtriage was 62.28% (95% CI: 61.94%–62.63%), and the rate of undertriage was 15.29% (95% CI: 15.10%–15.47%). The sensitivity was 53.71% (95% CI: 53.29%–54.13%), and the specificity was 74.31% (95% CI: 74.11%–74.51%). The NPV was 84.71% (95% CI: 84.59%–84.84%), while the PPV was 37.72% (95% CI: 37.46%–37.97%).

The incident types with the highest overtriage rates calculated using the Cribari Matrix (Table 3) were obstetrics (89.2%), gynaecology (86.4%), allergic reactions (78.9%), animal bites (77.9%), abdominal pain (75.1%), and vomiting and diarrhoea (74.6%). Conversely, the incident types with the highest rates of undertriage were noted for respiratory complaints (31.0%), diabetes (29.8%), chest pain (28.7%), electrocutions (28.6%) and unresponsive patients (26.6%). The modified calculation for undertriage revealed three incident types within acceptable rates: unresponsive patients (1.4%), patients with seizures (4.1%) and patients with motor vehicle accidents (0.4%).

Table 2 Statistical analysis of dispatch priorities

Statistic	Value	95% Confidence Interval
Undertriage	15.3%	15.1%–15.5%
Overtriage	62.2%	62.0%–62.6%
Modified undertriage	46.3%	45.7%–46.9%
Sensitivity	53.7%	53.3%–54.1%
Specificity	74.3%	74.1%–74.5%
Positive predictive value (PPV)	37.7%	37.5%–38.0%
Negative predictive value (NPV)	84.7%	84.6%–84.8%
Accuracy	69.7%	69.5%–69.9%
Positive Likelihood Ratio	2.09	2.07–2.11
Negative Likelihood Ratio	0.62	0.62–0.63

Discussion

This study sought to determine the triage performance of EMD priority allocation compared to that of on-scene ambulance triage according to the SATS. This study revealed overtriage and undertriage across all incident types. Previous studies from South Africa have reported a sensitivity of 49.24% (95% CI, 48.10–50.38) [8] in comparison to 53.71% (95% CI, 53.29%–54.13%) in this study. This study also showed an improvement in specificity from 71.96% (95% CI, 71.00–72.92) [8] to 74.31% (95% CI, 74.11%-74.51%). These improvements offer some encouragement; however, they are insufficient to reduce the overtriage and undertriage rates to acceptable ranges.

Pain (noncardiac) was the highest volume of primary emergency cases in the EMD (20%) and was mostly dispatched as P2 (96.7%), with an overtriage rate of 65.5% and an undertriage rate of 14.8% (modified undertriage 92.7%). In this context, noncardiac pain refers to pain in a specific body region, such as the abdomen [18]. The classification of noncardiac pain is found to be closely interrelated with other incident types, influencing their categorization. It is recommended that noncardiac pain in the WCG EMD not be used as an incident type but rather as a descriptor to be incorporated into SATS where it may guide triage decisions in the EMD [13, 19].

Table 3 Dispatch priority vs EMS triage per incident type

Incident Type	P1			P2			TOTAL	Over Triage	Under Triage	Modified Under Triage
	Orange/ Red n (%)	Green/ Yellow n (%)	Total P1 Dispatch	Orange/ Red n (%)	Green/ Yellow n (%)	Total P2 Dispatch				
Abdominal pain	44 (24.9%)	133 (75.1%)	177	1,275 (9.7%)	11,844 (90.3%)	13119	**13,296**	75.1%	9.7%	96.7%
Accidental injury - domestic	306 (28.5%)	769 (71.5%)	1,075	852 (14.6%)	5,003 (85.5%)	5855	**6,930**	71.5%	14.6%	73.6%
Accidental injury - industrial	69 (33.1%)	139 (66.8%)	208	118 (15.8%)	627 (84.1%)	745	**953**	66.8%	15.8%	63.1%
Accidental injury - sports	50 (29.0%)	122 (70.9%)	172	103 (13.5%)	658 (86.5%)	761	**933**	70.9%	13.5%	67.3%
Allergic reactions	27 (21.1%)	101 (78.9%)	128	61 (7.3%)	775 (92.7%)	836	**964**	78.9%	7.3%	69.3%
Animal bites	46 (22.1%)	162 (77.9%)	208	129 (6.9%)	1,734 (93.1%)	1863	**2,071**	77.9%	6.9%	73.7%
Assault	3252 (36.9%)	5,544 (63.0%)	8,796	2328 (12.5%)	16,348 (87.5%)	18676	**27,472**	63.0%	12.5%	41.7%
Burns	162 (38.5%)	259 (61.5%	421	184 (16.9%)	906 (83.1%)	1090	**1,511**	61.5%	16.9%	53.2%
Chest pain	1433 (45.45%)	1,718 (54.5%)	3,151	86 (28.7%)	214 (71.3%)	300	**3,451**	54.5%	28.7%	5.7%
Seizures	4,241 (41.7%)	5,927 (58.2%)	10,168	182 (26.3%)	511 (73.7%)	693	**10,861**	58.3%	26.3%	4.1%
Diabetes	977 (50.5%)	956 (49.5%)	1,933	95 (29.8%)	224 (70.2%)	319	**2,252**	49.5%	29.8%	8.9%
Submersion incidents	28 (49.1%)	29 (50.9%)	57	5 (14.3%)	30 (85.7%)	35	**92**	50.9%	14.3%	15.2%
Electrocution	22 (56.4%)	17 (43.6%)	39	2 (28.56%)	5 (71.4%)	7	**46**	43.6%	28.6%	8.3%
Haemorrhage	150 (29.89%)	352 (70.1%)	502	691 (15.1%)	3,875 (84.9%)	4565	**5,067**	70.1%	15.1%	82.1%
Heart related problems	355 (41.8%)	495 (58.2%)	850	82 (24.3%)	256 (75.7%)	338	**1,188**	58.2%	24.3%	18.8%
Environmental Exposure	7 (29.2%)	17 (70.8%)	24	6 (11.5%)	46 (88.5%)	52	**76**	70.8%	11.5%	46.2%
Gynaecology	97 (13.6%)	617 (86.4%)	714	330 (11.5%)	2,541 (88.5%)	2871	**3,585**	86.4%	11.5%	77.3%
Obstetrics	345 (10.8%)	2,858 (89.2%)	3,203	949 (6.6%)	13,341 (93.4%)	14290	**17,493**	89.2%	6.6%	73.3%
Psychiatry	86 (45.7%)	102 (54.3%)	188	192 (18.1%)	871 (81.9%)	1,063	**1,251**	54.3%	18.1%	69.1%
Motor vehicle accidents	2,757 (32.0%)	5,842 (67.9%)	8599	11 (15.9%)	58 (84.1%)	69	**8,668**	68.0%	15.9%	0.4%
Musculoskeletal complaint	92 (33.00%)	187 (67.0%)	279	1,483 (17.8%)	6,834 (82.2%)	8,317	**8,596**	67.0%	17.8%	94.2%
Neurological complaint	1,696 (40.6%)	2,480 (59.4%)	4176	1,806 (20.4%)	7,070 (79.7%)	8,876	**13,052**	59.4%	20.4%	51.6%
Respiratory complaint	8,611 (39.5%)	13,166 (60.5%)	21777	3,296 (31.0%)	7,350 (69.0%)	10,646	**32,423**	60.5%	31.0%	27.7%
Vomiting/Diarrhea	178 (25.40%)	523 (74.6%)	701	2,461 (17.0%)	12,019 (83.0%)	14,480	**15,181**	74.6%	17.0%	93.3%
Pain (noncardiac)	556 (34.5%)	1,057 (65.5%)	1613	7,028 (14.8%)	40,330 (85.2%)	47,358	**48,971**	65.5%	14.8%	92.7%
Patient unresponsive	2,165 (45.7%)	2,576 (54.3%)	4741	30 (26.6%)	83 (73.5%)	113	**4,854**	54.3%	26.6%	1.4%
Self Harm	1,075 (43.7%)	1,383 (56.3%)	2458	362 (19.1%)	1,530 (80.9%)	1,892	**4,350**	56.3%	19.1%	25.2%
Fever	270 (32.9%)	550 (67.1%)	820	971 (18.3%)	4,341 (81.7%)	5,312	**6,132**	67.1%	18.3%	78.2%
Other	165 (40.4%)	243 (59.6%)	408	101 (22.5%)	347 (77.5%)	448	**856**	59.6%	22.5%	38.0%

Aircraft, aviation incidents, cancelled calls, dehydration, dermatological, factory explosion, food poisoning incident, forensic pathology, grass/rubbish, hazmat, high angle incident, industrial, informal structures, multiple special service incident, offices/shops, paediatric icu, rail incident, recovery incident, residential, single paramedic rapid intervention non transport, ship at sea medical advice, staff related incident, train and railway incident, transport fires, urban search and rescue, water rescue without drowning, wilderness search and rescue

Removing noncardiac pain as an incident type may also reduce classification ambiguity and enhance the accuracy of incident reporting, thereby supporting future research and system development.

Obstetric and gynaecological complaints reported the highest overtriage rates in this study, which is consistent with the findings of previous studies [8]. Gynaecological (OR 0.40 (95% CI: 0.27–0.59)) and obstetric (OR 0.18 (95% CI: 0.13–0.24)) incidents have been found to be protective against non-conveyance to hospital [7] despite being overtriaged. The total proportion of gynaecological and obstetric complaints categorized as P1 in the EMD constitutes 1.3% of all emergency calls. Given this relatively low incidence, its impact on EMS resource utilization is expected to be minimal. Overtriage may be justified in this context, considering that maternal and child mortality remains high in South Africa [20]. Furthermore, access to primary care in South Africa is also challenging for many reasons, such as transport and affordability [21]; therefore, these patients rely on EMS for assistance.

Abdominal pain also had a high impact on the total volume, with 98.7% (n = 13 119) of these calls being dispatched as P2 with an overtriage rate of 75.1%. Vomiting and diarrhoea, which are associated with abdominal pain [22–24], is overtriaged at 74.6% and undertriaged at 17.0%, with the majority of these patients being dispatched as P2 (95.4%). An earlier study in the WCG noted abdominal pain to have an overtriage of 66.3% and undertriage of 12.4% [8]. Patients requesting an EMS response for abdominal complaints and vomiting/diarrhoea are more likely to be transported to the hospital than not being transported [7]. Although these cases seem to be overtriaged, it is reported that patients in a tertiary hospital in South Africa has recorded higher rates of emergency abdominal surgeries compared to elective surgeries [25]. This may be of concern as developed countries report contradictory results [25] indicating that despite the overtriage, there may be some merit in transporting these patients to hospital. Further, gastrointestinal keywords have been highlighted as the largest category in the description of patients with sepsis [26]. These may result in pressure being placed on EMS operations in the transportation of these patients to hospital. Despite these concerns, abdominal complaints are most common among patients discharged from hospital emergency centres (ECs) via EMS [27] and are a contributing factor to overcrowding in the EC. With high overtriage and undertriage rates, it is evident that current dispatch methods for abdominal pain is insufficient and there exists gaps which negatively influence accuracy levels within the EMD. It is recommended that further investigations into dispatch mechanisms be conducted, including the development of an acuity dispatch tool for both high and low acuity cases. This would enhance the accuracy of EMD dispatch triage and reduce the high rates of overtriage and undertriage.

An overtriage rate of 60.5% was associated with respiratory complaints, yielding similar results to previous studies [8]. Growing rates of asthma (18.5 per 100 000) and high mortality rates noted in South Africa, together with the burden of a high incidence of tuberculosis and chronic obstructive airway disease [28, 29], must be noted. The high mortality rate and increase in these volumes of respiratory complaints reinforce the practice of dispatching these cases with intentional overtriage serving as the safer alternative [18]. Expert consensus also agrees and reports that cases of respiratory distress should not be deemed low acuity, which would therefore further justify the rate of overtriage [30]. However, many of these patients are treated on scene and not conveyed to the hospital; a previous study showed increased odds of non-conveyance in respiratory incidents (OR 1.46 (95% CI: 1.19–1.8)) when patients were nebulized on scene (OR 1.45 (95 % CI: 1.21–1.74)) [7]. These respiratory cases logically contribute to higher overtriage, as EMS resources are initially dispatched as P1, provide on scene treatment, and subsequently downgrade the triage level as patients respond to treatment. Conversely, respiratory complaints also had the highest undertriage rates (31.0%) in this study, which also brings into question the safety of current prioritization methods [31]. With a high burden of respiratory pathologies in South Africa, undertriage delays diagnosis and medical treatment for patients, which could be lifesaving. With expert consensus stating that these respiratory complaints cannot be triaged as low acuity in telephonic dispatch [30], it is recommended that these cases be dispatched as P1 to minimize the risk of undertriage. Given the complexity of these cases, further research should be conducted to better understand and address over triage [30].

Both chest pain and heart-related problems have 54.5% and 58.2% overtriage respectively. Caution is utilized in dispatching these types of calls with a fear of legal repercussions and possible death of the patient [18]. The most prevalent cause of death in South Africa after HIV infection (23%) was cardiovascular disease (combined with cerebrovascular disease) (17%), which also increased markedly from 2007 to 2017 [32]. Although these cases are above the recommended overtriage rate of 35% [14], approximately 4.5% of these patients are discharged by the hospital EC [27]. These chest pain and heart-related patients are also undertriaged, with respective rates of 28.7% and 24.3% which are of concern. Experts within the EMS also agree that these patients are difficult to classify as being low acuity from an EMS dispatch perspective and should be treated as being higher acuity [30]. Despite this, a study conducted in a South African EMD revealed

that keywords and phrases commonly used by members of the public when calling the EMD for chest pain have been sort [31]. This study also recommended the development of validated dispatch algorithms [31] which may assist in the mitigation of the high risk in dispatching these cases.

The following recommendations should be considered to enhance the current results: develop evidence-based dispatch algorithms to improve overtriage and undertriage rates; address current options of incident types to enhance the clarity, depth of information, accuracy of reporting and facilitation of future system enhancements.

Limitations

The data provided by the WCG may prove to be valuable within its own region; therefore, this study should be repeated in other settings with its own focus. This study used the Cribari Matrix in the calculation of triage rates; therefore, attention must be exercised when making comparisons of these triage rates to those of other studies utilizing different triage calculation methods. The triage calculations and norms used in this study have not been validated outside of facility-based trauma populations in higher income settings. In-hospital triage of patients transported by EMS were not measured to determine the accuracy of triage or the outcomes of the patients, which may validate the accuracy of prehospital triage. It should also be noted that triage in the WCG is calculated using SATS; therefore, other settings using a different triage system must be considered. Finally, on-scene triage is dependent on provider input and could result in some errors.

Conclusion

This study has provided valuable information on specific areas of development in the context of overtriage and undertriage within the respective incident types. The results provide a reference point in the Western Cape for future comparisons of triage rates in order to track overtriage and undertriage rates. The results of this study can also be used to inform the development of policies, processes and guidelines in dispatching systems which may contribute to the optimization of prehospital resource management and patient care.

Abbreviations

EMS	Emergency medical services
EMD	Emergency medical dispatch
WCG	Western Cape Government
CAD	Computer-aided dispatching
ePCR	Electronic patient care records
SATS	South African Triage Scale
ACSCOT	American College of Surgeons Committee on Trauma
ECs	Emergency Centres

Supplementary information

The online version contains supplementary material available at https://doi.org/10.1186/s12873-025-01198-9.

Supplementary Material 1

Supplementary Material 2

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Author contributions

F.B designed and wrote the the manuscript, analyzed and interpreted the data. L.W conducted critical revision of the manuscript. W.S supervised the design and drafting of the manuscript. All authors reviewed the manuscript, approved the version to be published and agreed to be accountable for all aspects of the work.

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Data availability

Data is provided in the supplementary file

Declarations

Ethics approval and consent to participate

Approval for the data was provided by the Western Cape Government department of health via the National Health Research Database (NHRD). This was a retrospective study where data was anonymised during data extraction. Ethics approval and waiver of informed consent for this study was granted by the Human Research Ethics Committee of the University of Cape Town (HREC Ref 546/2019).

Consent for publication

Not Applicable

Competing interests

The authors declare no competing interests.

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