

**AN ASSESSMENT OF EMERGENCY CARE CAPACITY AT THREE
HOSPITALS IN THE HARARE METROPOL, ZIMBABWE: A DESCRIPTIVE
CROSS-SECTIONAL STUDY**

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List of abbreviations.

AFEM - African Federation of Emergency Medicine

DALY - Disability Adjusted Life Years

EC - Emergency Care

ECAT - Emergency Care Assessment Tool

ECS - Emergency Care System

ED - Emergency Department

EM - Emergency Medicine

EMS - Emergency Medical Services

ESRAT - Emergency Services Resource Assessment Toolkit

GDP - Gross Domestic Product

HEAT - Hospital Emergency Unit Assessment Tool

ICU - Intensive Care Unit

LMICs - Low-middle-income country

MDPCZ - Medical and Dental Practitioner Council of Zimbabwe

OPD - Out Patient Department

sidHARTE - Systems Improvement at District Hospitals and Regional Training of Emergency Care

UCT - University of Cape Town

WHO - World Health Organisation

Literature Review.

1.1 Objectives of literature review.

The literature review aims to:

- To describe Zimbabwe's country profile, highlighting key demographic, economic, and social factors impacting its healthcare system.
- To describe the evolution of emergency medicine in Africa, emphasising the contextual factors derailing its development in Zimbabwe.
- To give an overview of African EC systems, focusing on Zimbabwe's unique challenges and advancements.
- To discuss the significance of and tools for appraising EC systems.

1.2 Literature search strategy.

Multiple databases were utilised for literature search, including PubMed and Google Scholar, and accessed via the UCT online library. Grey literature was identified through Google searches. Keywords used in the search comprised combinations of terms such as Zimbabwe, Harare, emergency medical services, access, Sub-Saharan Africa, emergency department or emergency unit, Emergency care systems, emergency medicine, burden of disease, private, HICs, LMICs, World Health Organization, HEAT, emergency care assessment tools, EC systems strengthening or development, challenges, economy, and healthcare. Due to limited studies on emergency care in Zimbabwe, the search period ranged broadly from 2005 to the 31st of January 2024.

1.3 Background.

Emergency medical care is "an integrated platform for delivering accessible, quality, time-sensitive health care services for acute illness and injury across the life course" (1). It is a critical component of a healthcare system and serves as the "reception" for patients in healthcare facilities (2).

Emergency Care (EC) forms an essential link in the survival of acutely ill patients. It is part of a continuum of care usually initiated by bystanders and continued during transportation by

Emergency Medical Services (EMS) until admission into a hospital (3,4). According to WHO, this continuum of care is provided at different levels: prehospital care (care at the scene and en route to fixed facilities) and facility-based care (emergency unit care through to early operative and critical care) (5).

Emergencies globally account for 28 million deaths annually and contribute a large proportion of disability-adjusted life years (DALYs) (6). They encompass various time-sensitive conditions, such as traumatic injuries, infectious diseases, pregnancy complications, and acute or decompensated chronic medical and surgical conditions (7). Failure to promptly recognise emergencies and deliver rapid, high-quality emergency interventions results in increased complications, permanent disability, and preventable deaths. (8–10).

Providing high-quality EC is a powerful strategy for mitigating the global disease burden (11). Extensive research has consistently highlighted significantly lower mortality rates and shorter hospital stays in countries with efficient, high-quality Emergency Care Systems (ECS) compared to those with limited access to emergency services (12–14). By minimising complications and hospitalisation durations, efficient and high-quality EC reduces overall healthcare costs and ensures universal access to healthcare (11,15).

Despite their widely recognised importance, ECS remain underdeveloped in many parts of the world. This is particularly evident in many low- and middle-income countries (LMICs), where ECSs are still nascent or, more frequently, absent altogether (14,16). Consequently, low-income countries bear the brunt of the highest morbidity and mortality rates stemming from otherwise preventable acute illnesses and injuries (17–19).

1.4 Healthcare System in Zimbabwe: Challenges and Opportunities.

The Republic of Zimbabwe, located in the Southern African region, is a landlocked country characterised by a population of about 16.3 million people and an annual growth rate of 2 % (20). The demographic landscape is reflected in a distinctive triangular population pyramid, signifying a considerable concentration of individuals in the youthful age groups, resulting in an average age of 18.4 years (20).

The socio-economic fabric of Zimbabwe is characterised by a predominantly rural population, with approximately 61.4% residing in rural areas, while 38.6% are distributed across towns and cities (20). This demographic distribution has implications for various aspects of life, including healthcare accessibility, infrastructure development, and economic opportunities.

Zimbabwe struggles with glaring socio-economic inequalities, marked by a notable erosion of its middle-income class. Economic instability, marked by fluctuations since 2000, unfolds amidst a challenging backdrop of political unrest, corruption, and mismanagement (21). Key sectors like agriculture and industry, pivotal to the nation's economic foundation, have experienced a notable decline (22).

As of 2022, Zimbabwe's Gross Domestic Product (GDP) per capita stood at USD 1,676 (23). Paradoxically, almost 80% of the population is impoverished, positioning Zimbabwe among the world's poorest nations (24). Most of the people work in the informal sector. Official estimates indicate that the unemployment rate might be as low as 20%, with the majority engaged in the informal sector (25). However, this sector is marked by low wages, poor working conditions, and a lack of labour representation and social security.

1.4.1 The State of Healthcare Systems in Zimbabwe

The economic downturn in Zimbabwe has exerted a profound and enduring impact on the country's healthcare system, plunging it into a crisis that persists today (26). Once hailed as an exemplary healthcare system in Africa, Zimbabwe's public healthcare infrastructure, characterised by a robust primary healthcare network and a cadre of skilled healthcare professionals, has suffered severe setbacks, resulting in a decline in the healthcare system's functionality (27).

The public healthcare system in Zimbabwe is contending with an escalating shortage of skilled healthcare practitioners and essential medical supplies (26). This crisis is exacerbated by a concerning trend of emigration among skilled medical practitioners, driven by inadequate compensation, with a notable efflux seeking opportunities abroad, particularly in the UK and Ireland (28). As reported by the Health Services Board Chairperson, in 2022

alone, Zimbabwe experienced a significant loss of approximately 11%, equivalent to 4,000 nurses and doctors (29), out of the 34,900 recorded on the WHO National Health Workforce Accounts Data (30).

Public hospitals in Zimbabwe are underequipped and lack the most fundamental equipment or basic drugs (31). Unfortunately, only 3.4% of Zimbabwean GDP is allocated to public healthcare, the lowest in Southern Africa (23). This allocation falls significantly short of the WHO's recommended health expenditure. Instead, the country has shifted the responsibility for healthcare funding to donors, private, and non-governmental organisations (32). Consequently, the healthcare system relies heavily on external donor funding, which is not sustainable (33,34).

Conversely, the private healthcare sector in Zimbabwe has experienced substantial growth since 2000, capitalising on the diminishing capacity of the public healthcare system to deliver quality medical services (35). This sector attracts skilled professionals from the public domain, offering competitive remunerations, better-equipped facilities, and a consistent supply of consumables (36). The allure of the private sector for staff makes public health clinics strained and compromises the quality of healthcare services available to the vulnerable local population (37).

Zimbabwe's private health expenditure ranks amongst the highest relative to total health spending worldwide (35). However, the fee-for-service model in private healthcare places a major access barrier for most people. With 60% of Zimbabweans living below the poverty datum line, a considerable portion faces financial constraints, limiting their ability to afford private healthcare services. Merely 10% of the entire Zimbabwean population enjoys the privilege of medical insurance coverage (38).

The protracted deterioration of Zimbabwe's healthcare infrastructure has led to widespread and profound consequences, manifesting in some of the poorest health indicators within the southern African region. According to 2022 statistics, life expectancy at birth, standing at 60.7 years, is significantly lower than the global average of 73.3 years (20). An intriguing trend in Zimbabwe's life expectancy reveals a substantial drop from 62 years in 1986 to a low of 42 years in 2000, coinciding with a broader socio-economic downturn that severely

impacted the healthcare system (39). While life expectancy has gradually increased since 2000, it lags behind other Southern African countries. This persistent disparity indicates Zimbabwe's ongoing challenges and protracted path to universal health coverage (40).

Zimbabwe holds the unfortunate distinction of having some of the highest mortality rates in southern Africa. Maternal mortality reflects the overall health status of women, their access to healthcare, and the healthcare system's responsiveness to their needs (41). In Zimbabwe, 357 women per 100,000 live births succumb to pregnancy-related causes as of 2022 (42). This distressing figure is intricately linked to delays in accessing appropriate obstetric facilities, particularly in rural areas where healthcare facilities are often staffed by personnel with limited obstetric skills (43). Furthermore, the country's capacity to perform caesarean sections is limited, with a rate as low as 4.1% (44), falling significantly short of the 10% threshold identified by the WHO to reduce maternal mortality effectively (45).

The under-5 mortality trends in Zimbabwe also offer a compelling narrative of a struggling healthcare system post-colonially. Initially, there was a commendable decline, surpassing even the global rate. However, a pivotal shift occurred in 1997, leading to a surge in mortality rates from 75 deaths per 1000 live births to 100/1000 in 2000 (46). Since then, progress toward achieving the WHO's SDG 3.2.1, aimed at reducing child mortality, has been sluggish. Recent data from 2021 reveals Zimbabwe's under-5 mortality rate at 49.5, ranking among the highest in Southern African countries, second only to Lesotho (46). This highlights persistent socio-economic and environmental challenges children and vulnerable populations face, coupled with limited healthcare access in Zimbabwe (47).

Zimbabwe's healthcare landscape, like in other low-income countries in the Southern African region, is further complicated by a high burden of infectious, nutritional, neonatal, and maternal diseases, all indicative of poor healthcare systems (48,49). The 2019 Global Burden of Disease report reveals that 50% of Zimbabwe's DALYs emanate from lower respiratory tract infections, TB, HIV, diarrheal diseases, and nutritional diseases (50). Adding to the complexity is the substantial epidemiological transition, with trauma and non-communicable diseases gaining prominence over the past decade. Trauma, now ranked among the top 5 causes of death in the country (51), exerts additional pressure on an already strained healthcare system, potentially exacerbating health indicators.

In summary, the healthcare system in Zimbabwe is complex and grappling with multiple fronts. These multifaceted issues necessitate a comprehensive and integrated approach that considers the socio-economic determinants of health, strengthens healthcare infrastructure, and ensures equitable access to quality medical services nationwide. Achieving recovery requires sustained efforts, both domestically and through international collaborative partnerships in establishing a healthcare system that is resilient and responsive and can effectively meet the evolving health demands of Zimbabweans.

1.5 Emergency Medicine in Zimbabwe.

Emergency medicine (EM) is a specialised field dedicated to treating illnesses or injuries, often presenting as undifferentiated cases that demand immediate medical attention (52). EM has undergone significant global advancements since its formal recognition as a specialty, evolving into a highly dynamic and indispensable discipline (53,54).

Despite significant strides globally, the development of EM in Africa, particularly in Zimbabwe, presents challenges that impede the establishment of the speciality. Sawe et al. (55) highlight these challenges, including the shortage of local expertise crucial for training and providing clinical supervision to EM trainees and the inadequate infrastructure necessary for EM practice and training (55). In Zambia, Mwanza et al. (56) identified several obstacles, such as the absence of a structured prehospital ECS, insufficient resources in EDs, and the absence of an EM residency program and formal recognition of EM speciality. Similarly, in South Africa, Maharaj et al. (57) emphasised challenges like limited awareness of EM as a speciality and the presence of poorly equipped EDs. Additionally, according to Meshkat et al. in Ethiopia, challenges included the discontinuity of training and the difficulties faced in transitioning to practice within a locally emerging field (58).

A pivotal step in addressing these challenges has been the development of the emergency workforce capacity (54,55). Initiatives such as EM residency training programs and short courses have been instrumental in mitigating staffing challenges, EM leadership, and advocacy (54,59). In Africa the inaugural EM training program took root in South Africa in 2004, initiating a transformative period for emergency medical systems across the continent

(55). Subsequently, many countries have embraced EM, and various EM training programs have been established.

The establishment of many African EM programs has been made possible through international collaborations, where facilitated training initiatives in countries with established programs contribute to EM growth in regions still in its early stages (60). Upon returning to their home countries, EM specialists assume a critical role in initiating and advancing local training initiatives, fostering a sustainable development cycle.

Zimbabwe faces distinctive obstacles within this context. Despite some nationals acquiring EM training abroad, the persistent challenge of brain drain hampers the return of qualified specialists to Zimbabwe after completing their training, as also noted in Zambia (56). Consequently, the country struggles with a shortage of certified emergency specialists, and formal EM training remains absent. Additionally, EM currently lacks official recognition as a speciality in Zimbabwe by the Medical and Dental Practitioners Council (MDPCZ), posing further obstacles to the comprehensive development of ECSs (61).

1.6 Emergency Care System in Africa and Zimbabwe.

In many African countries and other LMICs, ECSs remain rudimentary and face persistent accessibility challenges (14). The growing interest in developing robust ECS in Africa in the past two decades stems from the recognition that the integration and improvement of ECS across all care levels can substantially impact countries' morbidity and mortality rates (62). In Africa, developing robust ECSs is fundamental for addressing the continent's colossal disease burden, where preventable diseases and injuries contribute the highest DALYs compared to the global average (63).

Despite having some form of ECS, most African healthcare systems lack the fundamentals of an organised ECS: basic out-of-hospital care and transportation, designated EDs with standardised protocols, and EC providers permanently stationed in EDs (14). In a survey conducted across Africa by Mould-Millman et al. (64), it was found that only one-third of the countries reported the existence of an EMS. The study also highlights that most ambulances

were staffed by basic emergency medical technicians, consequently limiting the scope of emergency interventions in the prehospital setting.

The WHO advocates for establishing well-organized ECSs incorporating simple and cost-effective emergency interventions, particularly in resource-limited countries (11,65,66). These recommendations are grounded in compelling evidence from several studies that demonstrated the feasibility of such systems and their potential to avert almost 50% of preventable deaths and associated disabilities. (2,59,66–69).

Efficient ECSs are becoming indispensable as trauma cases are escalating in LMICs, alongside the rise of other life-threatening emergencies such as stroke and cardiovascular incidents (70,71). The significance of emergency services is further heightened during pandemics, disasters, and conflicts (72). The ongoing global health and economic challenge posed by COVID-19 emphasised the critical functions of ECS. This crisis has laid bare the vulnerability of ECS's capacity to effectively respond to the escalating burden of both communicable and non-communicable emergencies, particularly in LMICs (73). As countries strive to recover from the pandemic's impact on their health systems and other sectors, not only revisiting and reinforcing ECS and national disaster plans have become imperative but also the need for international collaboration to address resource scarcity (74).

In recent years, a persistent and revitalised commitment to enhancing EC services has been evident across numerous African countries, including Zimbabwe (16,64). WHO has played a pivotal role in championing this cause, taking the lead in supporting research and developing tools for strengthening ECSs (11,66,75). The WHO's dedication to advancing EC is also emphasised by a series of resolutions passed from WHA56.24 to WHA72.16. These resolutions reflect concerted efforts to strengthen the ECSs of member states, with a primary goal of ensuring that high-quality and timely EC is accessible to all, aligning with the overarching principles of universal health coverage (14,76–78).

A landmark development in this ongoing endeavour is the latest resolution, WHA76.2 of 2023. This resolution builds upon and integrates prior resolutions' mandates and introduces renewed elements, providing an extraordinary opportunity for coordinated action among countries (79). It establishes a robust foundation for sustained advocacy for EC across the

globe. Significantly, the resolution calls for a multisectoral approach, emphasising collaboration and coordination across various sectors to address the intricate challenges inherent in ECSs (77,79).

At present, the state of EC in Zimbabwe remains largely uncharted. Formal research studies that assessed the availability of prehospital and hospital-based EC services in the country are limited. The scant information is primarily derived from local print and electronic media reports. These reports paint a concerning picture, revealing the profound impact of economic downturns, crumbling health facilities, and a massive exodus of healthcare professionals on the overall health system (80,81).

Meanwhile, there is a discernible surge in the demand for EC services, particularly in urban areas in Zimbabwe. This heightened demand has been attributed to the ongoing urbanisation process and increased road traffic accidents, exacerbated by the poor conditions of roads (82). The combination of limited formal research and anecdotal evidence underscores the critical need for a comprehensive assessment of Zimbabwe's EC landscape to inform targeted interventions and improvements.

1.7 Emergency Care Access.

EC access has been defined as “the timely use of services according to need” (83). Ideally, EC is accessible if it fulfils three components: affordability, acceptability, and accessibility (2,83). Affordability is the ability of patients to purchase EC without financial hardships (2). Acceptability is determined by the willingness of critically ill patients to seek emergency services and how their needs are met (2). Availability refers to the existence of high-quality ECS within reasonable reach when in need (83).

Although WHO is dedicated to universal access to EC for all, half of the global population remains without access to healthcare services leading to over 500 million individuals being driven into extreme poverty due to healthcare expenses (84). LMICs are seriously affected, with approximately less than 10% of the population in LMICs having access to EC, yet the burden of emergency conditions is enormous (4,85,86).

Chang et al.'s systematic review (87) revealed significantly lower EC usage rates in LMICs compared to HICs, with LMICs averaging 8 visits per 1000 people versus 264 in HICs, mainly due to limited access. The study also highlighted the substantial burden of emergency conditions in LMICs at 47,728 cases per 100,000 population, compared to 15,691 in HICs. Consistent with these findings, the Global Burden of Disease Study, as cited by Razzak et al. indicates a substantial disparity in emergency burden between regions, with the African region reporting 273 DALYs for every 1000 population compared to 100 DALYs for every 1000 in Europe (6).

Among LMICs, the Sub-Saharan Africa region has some of the worst emergency-related clinical outcomes and mortality compared to other LMICs. Obermeyer et al. observed mortality of 3.4% in sub-Saharan African EDs compared to 1.8% in other LMICs (88). Limited access to EC has been identified as a contributing factor to poor outcomes in sub-Saharan Africa (89). However, Shanthakumar et al. argue that the Sub-Sahara region carries a disproportional burden of emergencies, resulting in higher DALYs than in other LMICs (90).

In many LMICs, the absence of a well-structured prehospital ECS contributes to the delayed presentation of critically injured and ill patients, often resulting in poor outcomes and increased out-of-hospital mortality rates (91). Several studies report longer prehospital times in LMICs compared to HICs, where poorly developed prehospital systems are a contributing factor to higher out-of-hospital mortality (16,92,93). Moreover, most LMICs have limited hospital-based capacities to manage acutely ill patients. Lack of infrastructure, material resources, emergency workforce, and poor disaster planning have been reported in several studies to impact the delivery of high-quality ECS significantly (2,70,92,94).

Hence, strengthening ECS in resource-limited settings plays a pivotal role in mitigating both mortality rates and DALYs associated with emergencies. However, a robust ECS cannot be achieved in silos without a commitment to developing the whole healthcare system (14). Therefore, integrating EC into the broader healthcare framework is of paramount importance, aiming to increase early access to life-saving EC and achieve universal health coverage (1,83,95).

1.7.1 EC access in Zimbabwe

ECS in Zimbabwe is challenging to access and infrequently used (96). EC is ideally provided across various stages, forming a seamless progression of patient management from community intervention through transportation, in the ED, early operative intervention, and eventual admission into critical care. Across this spectrum, numerous challenges are evident at each stage, serving as barriers to access (86).

In Zimbabwe, like any other LMIC, poor access is evidenced by prolonged EMS response times, delayed arrival at EDs beyond "the golden hour", and high mortality both out of hospital and in the EDs (13,97–99). In addition, patients frequently arrive at the hospital by private transport. Wadling et al. (100) noted that this significantly impacts the evolution and outcomes of emergencies in America.

1.7.1.1 Out-of-hospital care

Basic out-of-hospital care is the first bottleneck to access in Zimbabwe. Bystanders frequently witness and react to community emergencies first, thus serving as the primary link to ECS. Community-based care is critical in assessing situations, identifying life-threatening injuries and illnesses, and initiating life-saving management while awaiting the arrival of the EMS (101). Investing in low-cost, adaptable community-based programs in LMICs, e.g., the Emergency First Aid Responder System (EFARS), significantly increases survival chances in community emergencies (102,103).

Unfortunately, similar to other Southern African nations, bystanders in Zimbabwe are resource-constrained, lacking essential elements like basic first-aid skills training, first-aid kits, automated external defibrillators, and PPE (103). Bystanders in Zimbabwe encounter significant communication challenges, especially in rural areas where mobile network challenges impede their ability to contact EMS and report incidents swiftly. This communication barrier is further complicated by the absence of a universally recognised emergency hotline number or code in Zimbabwe (61).

The second bottleneck to EC access emerges during transportation. EMS forms a critical interface that links patients from the scene to appropriate definitive care. In cases where

prehospital care is inaccessible, patients often resort to self-transportation from the scene to the hospital, utilising whatever form of transport is available, usually without prioritising safety (104,105). Moreover, self-transporting patients tend to present at the nearest or most convenient health facility, irrespective of the resources and capacity available at those facilities, to address their immediate medical care needs (93,106). This practice, unfortunately, leads to preventable loss of lives, as lifesaving resources may be available elsewhere in the healthcare system.

A scarcity of literature exists regarding EMS access and usage in Zimbabwe. The provision of EMS involves a collaborative effort between public and private providers nationwide. The shortage of ambulances is a notable challenge in Zimbabwe, particularly in rural areas (61,64). These rural areas, reflecting challenges seen in numerous Southern African countries, face prolonged prehospital times because of sparse EMS availability and considerable distances to hospitals (107).

In rural Zimbabwe, primary reliance is placed on public EMS provided by ambulances stationed at district hospitals. These ambulances, serving the entire district, are inaccessible due to their limited numbers, with an average of only two ambulances per district (108). Private EMS providers operating on a fee-for-service model are generally scarce in rural areas. Their prevalence is more pronounced in urban areas, where a relatively small portion of the population can afford to pay for their services, particularly those with medical insurance or higher financial means (61).

Despite private EMS options in urban areas, accessibility remains a substantial challenge, prompting most residents to rely on public EMS due to its affordability. Unfortunately, the public EMS system itself faces significant incapacitation. For example, the Harare City Council operates the exclusive government-funded EMS system in Harare, providing affordable services to all 3 million residents (61). Nevertheless, the efficiency of this system is greatly impeded by its limited fleet, comprising merely six functional ambulances instead of the recommended thirty-five (109). This limitation is worsened by frequent breakdowns attributed to insufficient maintenance and servicing, as reported in 2021 by the city council chief engineer (110).

Furthermore, prehospital care in Zimbabwe, like in many African countries suffers from inconsistent standards and varying capabilities among service providers, with some lacking standardised protocols (111). The personnel of each EMS operator have differing levels of clinical competence, with most being basic emergency medical technicians (61). As a result, critically ill patients transported by ambulances in Zimbabwe might experience different out-of-hospital treatment, sometimes failing below global standards, and some denied essential life-saving treatments (112,113). Hence, it is imperative to evaluate the effectiveness of EMS in Harare.

In-hospital care.

Facility-based EC represents the final hurdle in achieving comprehensive EC access. Timely access to an efficient ED, featuring a structured triage system, early identification of danger signs, prompt initiation of resuscitation, and seamless referral processes, has markedly reduced mortality rates across various emergency conditions. (62). Furthermore, establishing dedicated EDs staffed with permanently stationed, trained EC providers and implementing standardised protocols has been instrumental in reducing mortality rates (114). In Harare, EC has traditionally been provided at hospital entrances, commonly known as casualty areas.

Primary care centres typically lack EC services and instead refer patients to higher-tier medical facilities according to the referral process in the National Health Strategy 2021-2025 (96). Parirenyatwa and Harare Central Hospitals serve in the public sector as referral institutions; in the private sector, patients are directed to various private hospitals, including the Avenues Clinic.

Access to EC in Harare significantly varies based on the chosen service provider. Private care is generally inaccessible to most patients due to its high cost, potentially trapping families into financial hardship (35). Some EDs in the private sector demand payment before initiating triage and registration, contrary to the calls by WHO and the Government asserting that EC is a fundamental human right that should not be denied to anyone. While some private EDs comply and initiate pre-referral stabilisation, they often refer patients to

the public sector as soon as possible, even before they are fully stabilised and ready for transfer (115).

Private EDs in Harare typically experience lower patient volumes, creating a quieter environment. In contrast, public EDs experience overcrowding, mirroring the typical scenario in many public EDs across Africa (116,117). Overcrowding signals a disproportion between the demand for EC and the available physical, human, and structural resources (118,119).

The impact of ED overcrowding goes beyond extended waiting times, as it diminishes the quality of care, raises mortality rates, and increases the likelihood of medical errors (118). Patients may deem this compromised service delivery unacceptable, prompting some to sacrifice their savings for private care or explore alternative medicine as an alternative to public EDs (35). Instances of extended waiting times, with certain patients spending over 24 hours in the ED, have been reported in public EDs in Harare. These extended waiting times result in delayed diagnoses and high walkout rates among patients, some of whom require admission, potentially leading to irreversible disabilities or death (119).

Regarding geographical accessibility, Parirenyatwa and Harare Central Hospital are centrally located with a well-established road network, making them easily accessible. However, the primary referral catchment area extends up to 40km, and some areas face substantial prehospital travel times exceeding 2 hours, primarily due to poor road conditions and traffic congestion, particularly during peak hours. In the context of trauma cases, many of these patients would have surpassed the golden hour, a critical timeframe where prompt medical intervention significantly influences outcomes (120,121). The delayed presentation to the hospital is linked to higher out-of-hospital mortalities, a challenge observed in Zimbabwe and other LMICs with extensive distances to medical facilities (122).

The pressing question revolves around the capacity of Harare's EDs to cope with the escalating volume of emergencies. Unfortunately, there has been no formal assessment of these EDs' capacity to deliver facility-based EC. This study aims to be the first to characterise the resources and services provided by major EDs in Harare, recognising that ED performance and capacity hinge on numerous factors, including equipment availability,

personnel, stock, infrastructure, training, user fees, and opening hours. The absence of critical interventions or services signifies a limited capacity to deliver EC (71,92).

In conclusion, ECS in Zimbabwe is under-resourced and requires improvement at all levels of care, including care on scene, during transportation, and in health facilities. While resources remain a significant obstacle, there's also a pressing need for more innovative approaches that are simple and cost-effective to enhance the quality of care. Scarce research and evidence in EMS pose challenges in devising new evidence-based guidelines and protocols tailored to the Zimbabwean setting (71). Therefore, there is a pressing need to explore strategies to improve access to high-quality EC.

1.8 Emergency Care Assessment

A critical step in strengthening ECSs is to assess and compile a comprehensive description of the functional status of the system. Different elements that constitute emergency medical services (EMS) should be evaluated to inform available infrastructure, resources, and capabilities for delivering patient care. It will also reveal gaps and needs of prehospital and hospital-based care (64,70,71,123). These assessments will present an evidence-driven basis for prioritising interventions and help formulate responsive strategies that improve the capacity to provide appropriate EC (92).

The World Health Organization has been at the forefront of driving countries to develop integrated formal ECSs. It has called on its member states to prioritise the development thereof at the seventy-second World Health Assembly (1,64). WHO has contributed immensely to developing several tools and resources that can be used to assess and strengthen ECSs in low and middle-income countries (75). These tools evaluate infrastructure and EC capacity and have been deployed across different LMICs, demonstrating their efficacy in advancing EC development (71,92). Among the tools are the Service Availability and Readiness Assessment (SARA), Emergency Services Resource Assessment Toolkit (ESRAT), Hospital Emergency Assessment Tool (HEAT), and Emergency Care Assessment Tool (ECAT).

The SARA provides a framework for evaluating healthcare facilities' ability to deliver essential services, such as family planning, child health, emergency obstetric care, and the management of infectious and non-communicable diseases (124). Through systematic surveys, SARA assesses key factors like infrastructure, human resources, medical equipment, and essential medicines. This evidence-based data supports healthcare planning and helps identify service delivery gaps (125). While not specifically focused on emergency care, many SARA metrics are relevant, serving as a precursor to tools like the ECAT and HEAT.

1.8.1 The ESRAT

The ESRAT was developed in 2006 by the Columbia University Mailman School of Public Health in collaboration with WHO (126). It is a comprehensive tool designed to evaluate the hospital's capacity to manage emergencies by assessing its equipment, medications, staff training, and available emergency medical interventions. The ESRAT has been tested and refined through successful pilot implementations in various countries such as Ethiopia, Ghana, El Salvador, and Rwanda and has proven its efficacy in assessing and enhancing ECS (126).

The ESRAT is an integral component of the Systems Improvement at District Hospitals and Regional Training of Emergency Care (sidHARTE) Toolkit, which aims to strengthen ECSs in resource-limited settings. The results obtained from the ESRAT provide invaluable insights into the strengths and weaknesses of existing ECSs. When used in conjunction with other components of the sidHARTE Toolkit, the ESRAT helps develop specific interventions tailored to strengthen ECS and improve patient outcomes (126).

Firew et al. (127) employed the ESRAT to assess EC capacity across 22 healthcare facilities in Ethiopia. The study revealed significant variations in EC practices and capabilities, particularly the absence of standardised guidelines and procedures, along with substantial differences in triage and resuscitation area layouts. The study also highlighted common barriers to effective EC, including a shortage of emergency-trained staff, deficiencies in equipment, and infrastructural challenges, with only 30% of hospitals having access to running water. The findings from this assessment were intended to inform the prioritisation of action plans to improve the healthcare system (127).

As global health systems evolve, ESRAT remains a valuable instrument for assessing and enhancing EC capacity, significantly contributing to better health outcomes. Notably, ESRAT has recently been employed to deliver evidence-based recommendations, significantly advancing the state of EC amidst the COVID-19 pandemic (128).

1.8.2 The ECAT

Emergency medicine experts from various African countries collaboratively developed the ECAT in 2013 under the auspices of AFEM (71). Inspired by concepts primarily drawn from the WHO Emergency Obstetrics Care (EmOC) (129), ECAT was a strategic response to the lack of standardised measures for evaluating EC capacity, particularly in resource-limited settings (71,130). Its primary aim is to assess the delivery of essential medical interventions, termed "signal functions," within EDs, addressing six prevalent life-threatening conditions known as sentinel conditions (71,130). By homing in on these signal functions, the ECAT comprehensively evaluates EC readiness.

Numerous studies have utilised the ECAT to gauge the effectiveness of ECSs, as shown in Table A. In a study by Bae et al. (71) across various African nations, the active involvement of senior healthcare professionals provided valuable insights into the tool's applicability and relevance. The study outcomes significantly influenced the evolution of the ECAT, resulting in a refined version that categorises signal functions and assesses them in the context of specific barriers to care delivery (71).

Table A: Countries and timeline of ECAT and HEAT Studies.

| ED ^a Assessment Tool | Country of Study | Year | Author |
|---------------------------------|---|------|-------------------------|
| ECAT ^b | South Africa, Cameroon, Botswana, Uganda, Egypt, | 2018 | Bae et al. (71) |
| | Cameroon | 2018 | Kim, Pual (131) |
| | Myanmar | 2019 | Seo <i>et al.</i> (132) |
| | Zambia | 2019 | Chavula et al. (70) |

| | | | |
|-------------------|-------------|------|---------------------|
| | Cambodia | 2022 | Duk Hwan Ko (133) |
| HEAT ^c | Eswatini | 2020 | Pigoga et al. (92) |
| | Ethiopia | 2022 | Sultan et al. (114) |
| | Nepal | 2023 | Kharel et al. (94) |
| | Tanzania | 2023 | Ardsby et al. (134) |
| | Siera Leon. | 2024 | Bredow et al. (135) |

Emergency Department

^b Emergency Care Assessment Tool

^c Hospital Emergency Assessment Tool

1.8.2.1 ECAT in Zambia.

A study by Chavula et al. (70) applied the ECAT in Zambia, revealing areas for improvement and laying the groundwork for recommendations that fortified EC services in the region. The research showed that failure in care delivery stemmed from a shortage of trained EC workers and limited availability of essential medicines and supplies. By pinpointing critical systemic gaps, the ECAT serves as a catalyst for healthcare systems to fortify their responsiveness to acute illnesses and injuries, ultimately enhancing their overall capacity (70).

1.8.2.2 ECAT in Myanmar.

Seo et al. (132) assessed EC capacity in Myanmar using the ECAT across nine hospitals of varying levels. Results mirrored those seen in LMICs in Africa, highlighting inadequate trauma care interventions and suboptimal critical care capacity in basic and intermediate-level hospitals. The study also revealed systemic challenges, such as a shortage of trained healthcare workers and poor road networks as barriers to timely access to EC services (132). The ECAT assessment in Myanmar offers crucial insights for strengthening the country's ECS by guiding efforts to expand trauma and critical care services in lower-level hospitals and prioritize training initiatives for a more responsive ECS.

1.8.3 The HEAT

The HEAT was developed by WHO mainly from the AFEM's ECAT (71) and other tools relevant to low-income countries (14). Data from other Southern African countries using the

HEAT and similar tools like the ECAT is available (70,71,136). Although Zimbabwe shares many similarities with Southern African countries, this information may not be relevant to hospitals in Harare because of differences in economic and political factors.

The HEAT is a standardised tool that objectively measures hospital-based EC capacity. Capacity in this context refers to the overall functional performance of a unit in delivering critical and time-dependent emergency medical interventions (signal functions) (92,131,137). An efficient ED should be capable of providing these signal functions, which serve as indicators of EC capacity (71). Signal functions encompass various domains crucial for effective EC delivery, including infrastructure, equipment, human resources, policies, and protocols. Each domain comprises specific indicators and scoring criteria, facilitating a comprehensive assessment of EC capabilities across different healthcare system levels (130).

The HEAT is not yet a public document, but it has been used in other low-income countries in the Southern African region and has been shown to have internal and external validity. Previous studies, shown in Table 1, have used the HEAT to assess facility-based EC and have effectively described the infrastructure, equipment, human resources, and supplies for EC delivery in EDs (92,94,114,134,135). They also identified the gaps in service delivery and the specific causes of system failures that enable hospital managers to develop targeted change management strategies in developing a robust EC delivery system.

1.8.3.1 HEAT in Eswatini.

A study conducted by Pigoga et al. (92) identified varied services and EC capacities across the government referral hospitals in Eswatini, with most needing proper infrastructure for EC, like a designated ED. They also noted that the hospitals had limited supplies, equipment, medications, and skilled EC providers necessary to perform critical lifesaving procedures. As such, several opportunities for strengthening Eswatini ECS were identified, such as emergency medicine training, improving the supply chain, and implementing checklists and protocols in EDs (92).

1.8.3.2 HEAT in Nepal

Similarly, in a study conducted in Nepal, Kharel et al. (94) found varying capabilities among hospitals, with private hospitals showing better infrastructure and equipment availability, likely attributable to differences in financing systems. However, common barriers were identified across hospitals, including the absence of written protocols, limited access to point-of-care testing, and insufficient emergency skills training (94).

1.8.3.3 HEAT in Ethiopia.

In 2022, Sultan et al. (114) utilised the HEAT to assess referral public hospital EDs in Ethiopia. Interestingly, the findings of this study mirrored those of the Firew et al. study conducted in the same year using the ESRAT. Sultan et al. observed consistent trends, with 30% of hospitals lacking access to running water, experiencing shortages of trained emergency medical personnel, and lacking established emergency care protocols. The HEAT studies are valuable tools for monitoring and evaluating interventions to enhance facility-based emergency care delivery (92). However, since both studies were conducted concurrently, they served as baseline assessments, and the impact of interventions recommended by the other could not be ascertained.

1.9 Conclusion.

Conducting resource and needs assessments in EDs is crucial for understanding the current capacity of facility-based EC delivery, identifying resource and systemic gaps, and informing evidence-based interventions tailored to specific settings. Studies using tools such as HEAT, ECAT, and ESTRAT have revealed diverse capacities in facility-based EC across different countries. However, shared challenges persist in most LMICs, particularly in Africa, mainly shortages of emergency-trained workforce and inadequate emergency care equipment. Within countries, variations in capacity have been observed between lower- and higher-level facilities and private and public hospitals, with tertiary and private hospitals generally demonstrating better capacities.

In this study conducted in Zimbabwe, while we anticipate findings similar to or worse than other HEAT studies in LMICs, given the absence of an EM residency training program and

the economic challenges affecting the healthcare system, the findings may differ due to potential resilience developed within the healthcare system over the years. The results of this baseline study will yield invaluable insights that we will use to strengthen ECSs in Zimbabwe.

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PART B: IN MANUSCRIPT FORMAT.

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An assessment of emergency care capacity at three hospitals in the Harare Metropol, Zimbabwe: A descriptive cross-sectional study.

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African relevance.

- A comprehensive assessment can highlight the needs and priorities of emergency care systems development.
- Assessing emergency units can help emergency care systems evaluate their preparedness to respond to natural disasters, disease outbreaks, and humanitarian crises in Africa.
- Efficient and well-equipped emergency units resulting from such assessments can potentially reduce morbidity and mortality rates associated with emergencies.

Abstract

Introduction

Zimbabwe has experienced significant population growth, as well as a rise in non-communicable diseases, impacting the demand for emergency care services. However, there is limited data on the state of Zimbabwe's emergency care systems to meet this growing need. This pilot study aimed to assess the capacity of emergency departments at three major referral hospitals in Harare, Zimbabwe.

Methodology

A cross-sectional descriptive study was conducted using the World Health Organization Hospital Emergency Assessment Tool. Key participants from each hospital were interviewed to gather data on facility characteristics, human resources, diagnostic services, and signal functions.

Results.

Three large hospitals offering round-the-clock emergency care services were included. A core of dedicated doctors and nurses manned the Emergency Department in all three facilities, yet none had specific training in emergency medicine. There were various significant challenges to the operation of emergency departments, including access to water for one, and two with limited capacity to perform emergency diagnostic tests as they lacked the necessary equipment and consumables. One hospital reported a sufficient set of emergency protocols and guidelines, while the other two hospitals exhibited varying levels of availability in these areas. Two facilities reported adequate capacity in performing more than 85% of signal functions. Common challenges included the absence of emergency-trained staff, lack of a formal triage system, and equipment deficiencies, all of which constrained their ability to deliver certain signal functions.

Conclusion

The HEAT assessment reveals a spectrum of service availability across the three hospitals, with common barriers identified. To strengthen the country's emergency care system, efforts should be focused on improving consumable supplies, prioritising training initiatives

in emergency medicine to build a skilled workforce and implementing standardised protocols and triage systems across facilities. Continuous monitoring and evaluation of implemented interventions are necessary to ensure sustainable improvements in emergency care delivery.

Keywords: Emergency Department, Emergency Care, Harare, HEAT, emergency care system strengthening.

Introduction

Emergency medical care is a critical component of a healthcare system and serves as the “reception” for patients in healthcare facilities (1). Emergencies account for approximately 28 million deaths annually worldwide, with a disproportionately huge burden on low-to-middle-income countries (LMICs), notably in Africa (2).

Like many LMICs in sub-Saharan Africa, Zimbabwe is dealing with a surge in demand for emergency care services amid poorly developed and persistently challenging access to Emergency Care Systems (ECSs) (3). The COVID-19 pandemic has revealed the weakness of LMIC ECSs in coping with the escalating burdens of both non-communicable and infectious diseases (4).

Compounded by the economic downturn of the last decades, Zimbabwe's healthcare system is in a protracted crisis (5). It is characterised by a scarcity of skilled healthcare professionals, with only 1.6 doctors and 19 nurses per 10,000 people (6). The lack of formal training in emergency care further compromises the prioritisation and delivery of high-quality EC (7). Emergency Medicine (EM) as a speciality remains unrecognised, with no EM training programs in Zimbabwe.

Recognising the urgent need to strengthen ECSs, the World Health Organization (WHO) advocates for establishing well-organized systems integrating simple, cost-effective emergency interventions, particularly in LMICs. Evidence suggests that these interventions have the potential to prevent up to 50% of avoidable deaths and disabilities (4).

A pivotal step in this endeavour is the comprehensive assessment of current ECS functionality. The WHO offers a standardised toolkit - the Hospital Emergency Unit Assessment Tool (HEAT) to objectively evaluate emergency care capacity, encompassing hospital infrastructure, human resources, clinical service availability, and signal functions (8). Signal functions assess an Emergency Department's (ED) ability to perform critical, time-sensitive interventions essential for managing life-threatening emergencies. The absence of critical interventions or services signifies a limited capacity to deliver emergency care (9,10).

As with previous research utilising the HEAT tool in similar LMIC settings, such as Zambia, Tanzania, Nepal, Eswatini and Ethiopia (10–12), this study aims to be the first to objectively assess the EC capacity at Harare’s three largest hospital EDs, characterising EC resources, pinpointing service delivery gaps and underlying causes of system failures. Study findings will enable policymakers and hospital managers to develop targeted interventions for a broader ECS improvement strategy for both these hospitals and the Harare Metropolitan Emergency Care Systems (ECSs).

Methodology.

This cross-sectional descriptive study utilised the HEAT toolkit and process to evaluate the facility-based emergency care delivery capacity of three major referral hospitals in Harare, Zimbabwe's capital.

According to the 2020 census, the Harare metropolitan district has an estimated population of around 3 million (13). The district is marked by significant inequality, with 60% of its residents living below the poverty line (14). This results in limited disposable income for accessing private healthcare services, leading many to rely on public healthcare options.

Only three hospitals were approached to be included in the study as a starting point and were selected to give a picture of the biggest hospitals in the city. Two major public hospitals, Parirenyatwa Group of Hospitals and Harare Central Hospital were deliberately included due to their significant role in providing most of the emergency care services in Harare’s public sector. They also serve as teaching hospitals, offering specialised tertiary services and receiving most referrals for critically ill patients nationwide (15). Several private healthcare facilities in Harare have varied capacities. Avenues Clinic is Harare's largest private referral hospital, catering to many privately insured emergency medical cases. Therefore, it was conveniently selected to provide insight into the perspective of private EDs in this context.

For each hospital, approval was obtained from management, who then assisted in identifying key participants who were administrators and clinical staff (doctors, nurses, radiologists, lab technicians) who had worked directly with the ED for more than three months.

Participants were then contacted, and if agreeable, were interviewed in person at their institution, along with being shown the HEAT tool. The consent process was conducted in English with translation into Shona when necessary, and written consent was obtained from all participants. Following the HEAT tool guidelines (Addendum 1 (supplementary material): Hospital Emergency Assessment Tool (HEAT), the data collection process comprised face-to-face interviews with individual participants and walkthrough sessions, during which the primary researcher made observations in each ED. The primary researcher, proficient in the HEAT tool, collected data and filled in the tool.

Key informants contributed to specific sections of the HEAT according to their areas of expertise. Objective data collection sections, such as those detailing ED human resources, were completed with only necessary key participants, while in subjective data sections, interviews were conducted with a minimum of three participants per HEAT section to improve result accuracy.

The HEAT employs availability rating questions to evaluate service or resource capability on a scale from 1 to 3: 1 indicates generally unavailable, 2 denotes some availability, and 3 signifies adequately available. When a question has three or more divergent responses, the median response becomes the final response. Average rating scores were calculated for each section and hospital to determine summative availability ratings. Identifying limited resources and challenges in delivering signal functions highlights a significant gap in emergency care delivery.

The data was entered and analysed in Microsoft Excel, where simple descriptive statistics like mean, percentages, and, where applicable, histograms were generated.

Ethical approval was obtained from the Medical Research Council of Zimbabwe (MRCZ/B/2556) and the University of Cape Town Human Research Ethics Committee (HREC: 531/2023). Additionally, institutional approvals were obtained, and the hospital administrators reviewed the results and agreed to their publication without influencing the conclusions. Anonymising hospital identities proved challenging in this study. However, hospitals have been de-identified where necessary, and only aggregated data is presented.

Results.

As outlined in Table 1, 25 key informants were interviewed from September 1st to October 31st, 2023, to complete various HEAT elements.

Table 1: Key participants' designation and HEAT sections completed^{ab}

| Designation/department | Hospital A ^c | | Hospital B | | Hospital C | |
|--|----------------------------|--------------------|---------------------------|--------------------|-------------------|--------------------|
| | Section answered | No of participants | Section answered | No of participants | Section answered | No of participants |
| Hospital Administrators | 1, 3.1, 3.2 | 1 | - | - | 1.1, 1.2, 1.3 | 1 |
| Health information systems manager | 1.1, 1.2, 3 | 1 | 1.1, 1.2 | 1 | 1.1, 1.2 | 1 |
| ED ^d Matron/nurses ^e | 1.2, 1.3, 1.4, 2, 3, and 4 | 1 | 1.2, 1.3, 1.4, 2, 3 and 4 | 2 | 1.3, 2, 3.1 | 1 |
| ED Doctors | 1.2, 1.3, 1.4, 2, 3, 4 | 3 | 1.3, 1.4, 2, 3, 4 | 3 | 1.3, 1.4, 2, 3, 4 | 4 |
| Radiology technician | 1.4, | 1 | 1.4 | 1 | 1.4 | 1 |
| Laboratory technicians | 1.4, | 1 | 1.4 | 1 | 1.4 | 1 |
| Totals | | 7 | | 9 | | 9 |

^a Participants completed sections of the HEAT depending on their areas of expertise.

^b Refer to Appendix 1 for detailed HEAT sections.

^c Hospitals were deidentified for confidentiality and to protect reputation.

^d ED – Emergency Department

^e ED doctors and nurses were those permanently rostered in the ED.

Facility Characteristics.

All three hospitals offered dedicated 24/7 EDs, separate from OPD. All EDs were accessible to ambulances, but one hospital faced challenges entering the resuscitation room due to turns and confined corridors hindering stretchers and wheelchair manoeuvrability.

All EDs were staffed by dedicated emergency providers physically present, complemented by various in-hospital specialists available on-call for after-hours emergencies. All EDs offered 24-hour laboratory, radiology, and theatre services.

As shown in Table 2, hospitals A and B demonstrate significantly greater inpatient bed capacity than C, having approximately 8 to 9 times more beds. Hospital C had a higher critical care bed capacity with 8 functional ICU beds. Hospitals B and C performed a comparable number of emergency operations in 2022 despite the significant difference in ED presentations. All EDs had high admission rates, with Hospital C at approximately 45% and Hospital B having the highest rate at about 88%.

Table 2: Annual facility metrics at three EDs for the year 2022.

| Descriptor | Hospital A | Hospital B | Hospital C |
|---------------------------------------|------------|------------|------------|
| ED ^a visits | 52 964 | 44 636 | 6 530 |
| OPD ^b visits | 111 057 | 110 364 | 8 400 |
| Inpatient admissions from ED | 38 227 | 39 567 | 3 000 |
| Total beds in ED | 7 | 10 | 5 |
| Inpatient hospital beds | 1072 | 1215 | 134 |
| Functioning operating theatres (24/7) | 2 | 2 | 1 |
| Functioning ICU ^c beds | 5 | 5 | 8 |
| Emergency surgical operations | 421 | 298 | 280 |
| Non-rotating ED Doctors ^d | 25 | 20 | 8 |
| Non-rotating ED Nurses | 92 | 66 | 11 |
| ED admission rate ^e | 72.17% | 88.64% | 45.94% |

^a ED – Emergency Department

^b OPD – Outpatient Department

^c ICU – Intensive Care Unit

^d Non-rotating – permanently stationed or dedicated.

^e ED admission rate = (inpatient admission form ED/ED visits) x100.

Infrastructure and Essential Equipment Availability.

As illustrated in Table 3, Hospital C exhibited adequate infrastructure and essential equipment availability, while Hospitals A and B showed some availability. All EDs are connected to the national grid and have backup diesel generators. One hospital has additional renewable energy backup.

One hospital reported challenges in accessing clean running water. It also lacks a dedicated staff room, accessible staff and patient toilet facilities, and consistent handwashing facilities. None of the EDs have dedicated isolation units for highly infectious diseases. Two EDs

reported electronic monitoring for less than 40% of their beds due to nonfunctioning equipment and financial constraints.

Table 3: Summary availability rating for services and signal functions in the three EDs.

| Service/ Function | Hospital A | | Hospital B | | Hospital C | |
|--|----------------------|----------------|------------|-------|------------|-------|
| | Average ^a | % ^b | Average | % | Average | % |
| Infrastructure and essential equipment | 2.48 | 61.90 | 2.10 | 33.33 | 2.76 | 85.71 |
| diagnostic services | 2.35 | 56.52 | 2.13 | 43.48 | 2.91 | 91.30 |
| Ancillary services ^c | 2.33 | 33.33 | 2.67 | 66.67 | 2.67 | 66.67 |
| Consulting services ^d | 3 | 100 | 3 | 100 | 3 | 100 |

^a The average score of all descriptors a hospital archived in each function.

^b The percentage of functions with reported adequate availability.

^c Ancillary services encompass social work, patient transport services within the ED, and security measures.

^d Consulting services refer to specialists who can be consulted to provide expertise in managing specific emergencies or complex cases in the ED.

Diagnostic Services

One ED reported adequate point-of-care and lab-based diagnostic capabilities, while the other two hospitals could not provide crucial tests such as troponin and lipase. This was attributed to the inconsistent availability of reagents due to their short shelf-life and cost. Additionally, two hospitals lacked access to portable X-ray machines, necessitating patient transfer to the radiology department, complicated by the occasional unavailability of radiographers. Hospital C was the sole facility with in-house access to CT scans and implemented a system enabling timely diagnostic test reporting by radiologists. One hospital reported a malfunctioning CT scan machine, while the other one didn't have one. In all EDs, diagnostic tests incurred costs, with one hospital requiring upfront payment while others billed patients later.

Human Resources.

All three facilities reported a consistent team of non-rotating doctors and nurses in the ED, as shown in Table 2. However, none had specialised EM providers citing the absence of a formal EM training program in Zimbabwe. While teaching hospitals occasionally had rotating

student nurses, none had rotating interns or registrars attached to the ED. Consulting services from the specialities assessed were readily available in all EDs (Table 3).

Clinical Services.

All three EDs provided initial life-saving interventions for critically ill or injured patients without requiring payment upfront. However, one hospital would not continue to provide care if patients or their families could not pay for services and would be referred elsewhere. None of the hospitals used a formal triage system or established time targets for patient waiting times. Social worker services were reported inadequate in all hospitals due to lack of funding.

One ED demonstrated extensive clinical protocols governing patient management and flow within and beyond the ED, while others had limited availability. Only one ED exhibited a comprehensive approach and protocols for special populations. None of the facilities had syndromic surveillance guidelines for public health coordination.

Signal Functions

Signal functions availability rating findings are presented in Table 4. Vital signs measurement before consultation was consistently reported across all EDs; however, Facility C lacked a designated triage area, measuring vital signs only in the consulting or resuscitation room, while at Facility A, personnel shortages sometimes caused delays in vital sign assessments.

All EDs reported adequate management of asthma and anaphylaxis and to recognise and intervene for tension pneumothorax. Facilities A and B reported training gaps in basic manual airway manoeuvres and non-invasive and surgical airway procedures in some clinicians. Across all EDs, some practitioners reported inexperience in thoracocentesis. All three EDs reported adequate bleeding control and volume resuscitation interventions. However, E-FAST exams, venous cutdown and central venous line establishment were infrequently performed across all EDs due to absent equipment and staff skill gaps.

Table 4: Summary of signal function availability rating.

| Signal Function | Hospital A: Average ^a availability rating (%) ^b | Hospital B: Average availability rating (%) | Hospital C: Average availability rating (%) |
|--|---|---|--|
| <ul style="list-style-type: none"> Vital signs, airway, and breathing interventions | 1.94 (17.65) | 2.53 (70.59) | 2.82 (88.24) |
| <ul style="list-style-type: none"> Circulation | 2.05 (42.86) | 2.10 (47.62) | 2.57 (71.43) |
| <ul style="list-style-type: none"> Neurologic Interventions | 2.42 (41.67) | 2.75 (83.33) | 3 (100.00) |
| <ul style="list-style-type: none"> Sepsis Interventions | 2.50 (50.00) | 2.74 (75.00) | 3 (100.00) |
| <ul style="list-style-type: none"> Trauma Interventions | 2.20 (30.00) | 2.70 (70.00) | 2.90 (90.00) |
| <ul style="list-style-type: none"> Obstetric Interventions | 2.67 (66.67) | 3 (100.00) | 3 (100.00) |

^a The average score of all descriptors a hospital archived in each signal function.

^b The percentage of functions with reported adequate availability.

Cardiac interventions showed varying capabilities: ECG interpretation, aspirating administration and thrombolytic therapy were available at one facility which had ACLS-trained staff. In contrast, others lacked ACLS-trained personnel and defibrillators and faced regular thrombolytic stockouts due to cost. Moreover, all EDs lacked pericardiocentesis capability due to training/experience gaps and equipment availability issues.

All EDs demonstrated adequate levels of neurological interventions encompassing protection from secondary brain injury, glucose management, benzodiazepine administration for seizures, and magnesium sulfate for preeclampsia. However, procedural sedation was inconsistently performed across all EDs, often deferred to specialists due to competency concerns.

Sepsis management was adequate across all hospitals, encompassing the ability to diagnose sepsis, administer antibiotics, and drain abscesses promptly, but a skills gap emerged in administering vasopressors in all EDs.

One ED reported adequate trauma interventions, performing initial appropriate wound management, cervical spine immobilisation, closed fracture and dislocation reduction, and administering antibiotics and opioid analgesia. The other two EDs reported some availability due to stockouts of vaccines, antibiotics, and consumables for immobilising fractures. Due to infrastructure challenges, no facilities could perform fasciotomies in the ED. Assisted vaginal delivery was adequate in all EDs, with oxytocin readily available, but neonatal resuscitation had some availability in one ED due to equipment breakdown.

Discussion.

This study is the first ED assessment conducted in Zimbabwe using the HEAT. It offers a comprehensive overview of EC capabilities across three key hospitals in Harare. It evaluates the equipment and infrastructural resources within their EDs and assesses their self-reported proficiency in performing critical, time-sensitive interventions for managing life-threatening emergencies. Common challenges emerged across all hospitals, serving as significant barriers to delivering high-quality EC.

The study highlights a gap in Zimbabwe's ECS: the absence of EM specialists and a formal EM training program. EM specialists fulfil multifaceted roles in ECS development including management, leadership, clinical oversight, team coordination, training, quality improvement, innovation, advocacy, and system efficiency (16). Given the resources identified in all three EDs, effective EM leadership and management could improve EDs' EC capabilities and overall patient outcomes.

EM training equips practitioners with the requisite skills for delivering high-quality EC. A significant barrier reported across all hospitals was the emergency skills gap among ED practitioners in performing critical lifesaving procedures such as non-invasive ventilation, procedural sedation, thoracocentesis, and cardiac interventions for ACS. These findings echo conclusions drawn from prior assessments in LMICs, where insufficient skills among ED practitioners were identified as a primary factor contributing to inadequate EC provision (10–12,17). In countries where ECS and EM training is not widely established, emergency practitioners often lack the necessary skills, leading to inadequacies in performing critical signal functions (18).

EM short courses serve as an important initial strategy for addressing the emergency skills gap among ED practitioners in regions where formal EM training is not yet well established. (19–21). The WHO has developed an Emergency Care Toolkit (ECT) tailored to LMICs, which includes basic emergency care courses to bridge the skills gap (22). ECT interventions, known for their simplicity and cost-effectiveness, have been shown to enhance EC delivery, resulting in a notable 50% reduction in emergency-related mortalities (7). Implementing the ECT could significantly improve EC delivery, particularly in Harare EDs, where a skills training gap was identified among ED clinicians.

This study also revealed a shortfall in medical education beyond the lack of EM specialist training, with undergraduate and specialist trainees lacking exposure to ED rotations. Addressing this gap requires EM specialists, a curriculum revision incorporating ED attachments, providing doctors with comprehensive exposure to various emergency conditions and procedural skills (23,24).

Another barrier to accessing EC was the inadequate availability of equipment and pharmaceuticals in two EDs, both public-sector hospitals. EDs lacking essential equipment such as defibrillators is widespread in many government-funded facilities across LMICs, where limited funding from the national budget hinders adequate resource allocation (25). Most healthcare systems in LMICs operate with insufficient funding, often receiving less than 10% of the Gross Domestic Product, compromising their ability to restock drugs and consumables and procure essential equipment (26). The absence of necessary equipment and diagnostic services delays patient care and disrupts patient flow, potentially leading to ED overcrowding and subsequent complications (27).

The study revealed a trend across all EDs, with a higher proportion of patients admitted from the ED than in established EDs elsewhere (46-89% admission rate in this study). This observation contrasts with studies conducted in neighbouring South Africa, where lower hospital admission rates have been reported. For instance, Taljaard et al. (28) found that 69% of ED presentations at a tertiary public hospital in East London resulted in a discharge after treatment, closely aligning with Hedding et al (29) study at a private hospital in Pretoria, where 76.1% of patients were discharged home following care. The high admission rates observed across Harare's EDs could indicate a lack of skills and competence in

definitive patient management within the ED (30). Additionally, limited access to primary healthcare services due to the country's failing health system could contribute to delayed presentations, leading to a higher proportion of critically ill or complex cases requiring admission, thus contributing to the high admission rates (30–32). High admissions strains healthcare facilities, impacting staffing, ED resource availability, and bed occupancy. Further case mix studies are needed to understand the diverse range of patient presentations and needs within EDs in Harare for planning and resource allocation (28).

None of the hospitals used a formal triage tool and system or established time targets for patient waiting times. Additionally, reception (triage) personnel had no training support, indicating a common gap in the prioritisation of patients based on acuity. This deficiency in implementing effective triage protocols is a common finding in assessments conducted in LMICs, particularly in regions where ECSs are still in the developmental stages (10). Lacking a standardised triage system can result in inconsistent patient prioritisation, leading to delayed critical interventions, resource wastage, and potential negative impacts on patient outcomes, including increased mortality rates (33).

Strengths and Limitations

The study utilised a validated tool and methodology to identify gaps in the emergency care system, presenting an opportunity for quality improvements in facility-based EC delivery. However, several limitations are acknowledged. Firstly, the assessment was confined to only three conveniently selected hospitals in Harare due to time and resource constraints, thereby limiting the validity and generalizability of the findings. A larger and more exhaustive sampling of EDs throughout the country would provide a more accurate assessment of EC capacities. However, we believe the findings are pertinent and likely represent some of the best care in the country. The study's reliance on only reported information from key participants may introduce bias due to potential vested interests, impacting their reporting of system shortcomings. To mitigate this, multiple participants were independently interviewed, and their responses were triangulated to enhance the objectivity and reliability of the findings.

Conclusion and Recommendations.

The study revealed varying degrees of availability, with private hospitals reporting better EC resources than public hospitals. Common challenges identified across all EDs included staffing, equipment, and training limitations.

Key areas for improvement might include strengthening training through short courses in EM, integrating ED attachments into undergraduate curricula, and collaborating internationally to establish local EM residency programs. Prioritising EC equipment purchase or replacement in hospital budgets and fostering public-private partnerships to enhance equipment capacity is vital. Ensuring the availability of standard protocols for common emergencies within EDs could streamline care delivery processes and improve patient outcomes.

Authors Contributions:

Authors contributed as follows to the conception or design of the work, the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: PD 80%, PH 20%. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of Competing Interest:

PD is a Zimbabwean doctor who trained at the University of Zimbabwe and did his internship at PGH and HCH. However, he is no longer working in Zimbabwe. Other than that, there are no other conflicts of interest.

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PART C: ADDENDA

Addendum 1 (supplementary material): Hospital Emergency Assessment Tool (HEAT)

**WHO
EMERGENCY UNIT
ASSESSMENT TOOL**



DRAFT 6 November 2017

For more information, contact: reynoldst@who.int

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Introduction

Emergency care addresses a wide-range of medical, surgical, and obstetric conditions, including injury, complications of pregnancy, exacerbations of non-communicable diseases (e.g. heart attacks, strokes), and acute infections (e.g. sepsis, malaria). Particularly in areas where barriers to care exist, emergency units are often the first point of contact with the healthcare system. Emergency care is a critical component of universal health care, and with sound planning and organization, has the potential to address conditions causing over half of deaths and a third of disability incurred annually in low- and middle-income countries.

A strategic assessment of emergency care capacity at healthcare facilities is among the first steps in the planning process. Findings can be used to identify gaps and target interventions at both individual facilities and across the healthcare system more broadly; in addition, periodic assessments may also be useful for monitoring capacity over time.

This assessment tool designed to evaluate the structure and key functions of an emergency unit (or any dedicated intake area for acutely ill and injured patients). It is derived from the WHO *Emergency Care System Framework*, WHO *Guidelines for Essential Trauma Care*, WHO *Tool for Situational Analysis to Assess Emergency and Essential Surgical Care* and the African Federation for Emergency Medicine *Emergency Care Assessment Tool*, and was informed by a broad review of other relevant instruments.

How to use this tool

This tool is designed to assess emergency care capacity and organization at the facility level. It can be used at an individual facility or across a group of facilities region- or country-wide. Hospital administrators and health system planners can use the findings to identify gaps in order to guide planning. If the tool is to be used at the regional or country level, either all facilities within a certain category should be assessed (all regional or district hospitals, for example), or a robust sampling strategy should be utilized to ensure that the facilities assessed best represent the regional or national reality. Sampling strategies for facility-based assessments include:

- Exhaustive sampling –all facilities in the target area (e.g., region, country) or of a specific type are assessed (eg. all district hospitals).
- Random sampling (including stratified and cluster random sampling) – facilities to be assessed are randomly selected from among a target group
- Purposeful sampling – facilities are chosen by well-informed stakeholders specifically to reflect the diversity of facilities, geography, administrative areas, patient volume, levels of care, etc.;

Exhaustive sampling of all relevant facilities is the most robust approach, but may not always be feasible. Considerations for choosing a sampling strategy include: objectives of the assessment, needs of stakeholders, total number and types of facilities, heterogeneity of the country or region (differences between urban and rural areas, for example), and need for statistical certainty. For more details on sampling strategies and sample size calculations for facility-based capacity assessments, see the WHO *Service Availability and Readiness Assessment (SARA)*: http://www.who.int/healthinfo/systems/SARA_Implementation_Guide_Chapter2.pdf.

Prior to performing the assessment, permission should be sought and granted by the appropriate national agencies and facility administrators. The facility administration can also help identify key informants to participate in the assessment. Ideally, more than one key informant is approached to complete the tool to allow triangulation of responses, which may improve the accuracy of the results. If more than one key informant completes all or the respective part of the tool, there are multiple ways to compile the results: i) the median response for each question becomes the final response; or ii) the response of the key informant with the most understanding of a specific resource, service or function becomes the final response; or iii) a consensus-process is initiated (eg, a meeting convened) and a single answer for each question agreed upon by respondents.

Potential key informants that might provide important information for this assessment include:

- Facility administrators (e.g., medical director, human resources director, operations officer, nurse matron);
- Providers (e.g., nurses, clinical officers, specialists) who work in the emergency unit;
- Laboratory and radiology unit technicians;
- Technicians and biomedical engineers who interact with equipment in the aforementioned units/departments;
- Procurement and medical stores staff;
- Facility statistics and health information staff.

Note that not all facilities will have staff in all of these positions, or even have each of the units/departments above. In addition, the informant with the highest authority at the facility may not be the informant with the most accurate understanding of the availability of a given resource. For the section on signal functions, the key informant should be someone with direct involvement in clinical care delivery.

It should also be noted that this tool does not define a minimum standard for every emergency unit at every level of the health system. It is intended as a general tool to identify gaps that can be addressed by implementation of standards promoted elsewhere. Ultimately, countries will need to determine which services they aim to provide at a given level of the health system.

Scoring system

There are four question types in this assessment:

1. Open-ended (e.g., name of facility);
2. Number response (e.g., number of emergency unit visits per year);
3. Discrete answers (e.g., yes or no);
4. Availability rating.

The availability rating questions are used to assess resource and service capacities, specifically the ability to perform key functions in the time frame needed for emergency care. These questions are meant to reflect the demand-side factors (e.g., number of patients in need) for the service, as well as the supply-side factors (e.g., sufficient resources, satisfactory training). For each of these questions, the resource or service should be noted as:

- 1 - Generally unavailable;
- 2 - Somewhat available (available to **ONLY SOME** of those who need it);
- 3 - Adequate (**PRESENT and AVAILABLE** to almost everyone in need, and used when needed).

If the availability rating is less than 3 (less than adequate), it is important to know the factors that contribute to its deficiency. Common factors that contribute to inadequate resources (such as supply chain problems, or lack of training) can then be identified and addressed. Therefore, for ratings less than 3, the person administering the survey should systematically prompt the key informant to identify reasons for the less than adequate rating; more than one factor can be marked per resource, service or function.

- *Infrastructure* - physical space, electricity, water
- *Absent equipment* – the resource is not present at the facility
- *Broken equipment* –the resource is present, but not in working order
- *Stock out* – the resource or function cannot be procured, or required supplies out of stock often due to stock management practices or procurement failures (e.g., reagents, tubes, IV catheters)
- *Training* – staff knowledge/skill gaps limit capacity to use the resource or perform a function

- *Personnel* - resource, service or function available, but lack of adequate numbers of staff limit capacity
- *User fees* - resource or function available, but out-of-pocket payment requirement prevents care delivery
- *Opening hours* - hours the facility can be accessed by acute patients
- *Other* – enter explanation in comments field

Signal Function Performance

Emergency care is a cross-cutting, service delivery innovation providing timely intervention for acute conditions such as sepsis or trauma. The capacity to perform key time-dependent interventions for these sentinel conditions can be used as a marker of overall emergency unit performance. Any limited availability of these key interventions signals a critical gap in emergency care delivery capacity. Use of these “signal functions” allows for a rapid, simple assessment and the identification of failures of emergency care delivery whose cause can then be identified and addressed. For example, identifying limited availability of intravenous volume resuscitation should prompt evaluation for causes such as lack of functioning equipment, supply stock-outs, gaps in staff skills/knowledge, or poor infrastructure.

Emergency Care Delivery Assessment

1. Facility Characteristics

1.1 Identifying Information

| | | | | |
|--------|---|---|----------------|-------------------------------|
| 1.1.1 | Date | | | |
| 1.1.2 | Country | | | |
| 1.1.3 | Name of facility | | | |
| 1.1.4 | Address of facility (include city, state or province) | | | |
| 1.1.5 | GPS Reading (if available) | Latitude: | <u>Degrees</u> | <u>Minutes</u> <u>Seconds</u> |
| | | Longitude: | | |
| 1.1.6 | Name person filling out form | | | |
| 1.1.7 | Facility Contact(s) | 1. Name: | Phone: | Email: |
| | | 2. Name: | Phone: | Email: |
| 1.1.8 | Level of facility* | <input type="checkbox"/> Health centre or clinic(1) <input type="checkbox"/> 1 st level hospital(2) <input type="checkbox"/> 2 nd level hospital(3) <input type="checkbox"/> Tertiary hospital(4) | | |
| 1.1.9 | Type of facility | <input type="checkbox"/> Private hospital(1) <input type="checkbox"/> NGO hospital(2) <input type="checkbox"/> Government hospital(3) | | |
| 1.1.10 | Distance to nearest higher level facility: | | | |
| 1.1.11 | Is there an area (room, unit, department) specifically designated for emergency care? Yes(1) No (2) | | | |
| 1.1.12 | Population served by facility (e.g., 123,000): | | | |
| 1.1.13 | Interview Start Time (Use 24 hr clock system): | | | |

*Footnote: see reference definitions

1.2 Facility Metrics

| | Descriptor | Number |
|------------------------|---|--------|
| 1.2.1 | Emergency unit visits per year | |
| 1.2.2 | Outpatient visits per year (excluding emergency unit visits) | |
| 1.2.3 | Inpatient admissions per year | |
| 1.2.4 | Beds/gurneys dedicated for general emergency care (not including inpatient beds) | |
| 1.2.5 | Inpatient hospital beds | |
| 1.2.6 | Functioning operating theatres (24/7) | |
| 1.2.7 | Functioning high acuity unit (e.g. ICU) beds with capacity for continuous monitoring and mechanical ventilation | |
| 1.2.8 | Emergency operations per year | |
| Available hours | | |
| 1.2.9 | During which hours is the emergency unit covered by providers who are <u>physically</u> present in the unit? | |
| 1.2.10 | During which hours is the emergency unit covered by providers who are on call, <u>inside the facility</u> ? | |
| 1.2.11 | During which hours is the emergency unit covered by providers who are on call <u>outside the facility</u> ? | |
| | Opening hours of: | |
| 1.2.12 | Emergency Unit | |
| 1.2.13 | Laboratory | |
| 1.2.14 | Pharmacy | |
| 1.2.15 | Radiology | |
| 1.2.16 | Operating Theater | |
| 1.2.17 | Comments: | |

1.3 Infrastructure and essential equipment

Rating: 1 - Generally unavailable, 2 - Some availability, 3 – Adequate

| | Infrastructure Element | Rating (1-3) | Comments (if rating <3) |
|--------|--|--------------|-------------------------|
| 1.3.1 | Clean, running water | | |
| 1.3.2 | Electricity source (e.g., wired, generator) | | |
| 1.3.3 | Designated telephone or radio for communicating with other facilities and/or prehospital providers | | |
| 1.3.4 | Paper-based emergency unit chart | | |
| 1.3.5 | Electronic emergency unit chart | | |
| 1.3.6 | Isolation room for infectious diseases (e.g., TB, haemorrhagic fever) | | |
| 1.3.7 | Easy physical access to emergency unit for those requiring a wheelchair or stretcher | | |
| 1.3.8 | Designated waiting area | | |
| 1.3.9 | Designated triage area | | |
| 1.3.10 | Designated resuscitation area | | |
| 1.3.11 | Personal protective equipment (e.g., hair covers, eye protection, N95 face masks, impermeable gowns, shoe covers, gloves) in a range of sizes | | |
| 1.3.12 | Electronic cardiac monitoring in emergency unit | | |
| 1.3.13 | Crash trolley or code cart with high-acuity equipment and supplies of various sizes in emergency unit | | |
| 1.3.14 | Rapid access to a transport ambulance and provider to administer care during transport for patients who need to be transferred to another facility | | |
| 1.3.15 | Is there a dedicated mechanism (radio, telephone) for communication with other facilities for transfer of patients? | | |
| 1.3.16 | Is there access to storage space within (or with immediate proximity to) the emergency unit, including secure storage for controlled substances? | | |
| 1.3.17 | Access to dedicated staff work area | | |
| 1.3.18 | Access to toilet facilities for patients and staff | | |
| 1.3.19 | Access to handwashing facilities in each patient care area | | |
| 1.3.20 | System for stocking, managing, and dispensing medications in emergency unit | | |
| 1.3.21 | Oxygen in emergency unit | | |

| | Which of the following methods supply oxygen in this unit?: | Yes | No |
|--------|--|-----|----|
| 1.3.22 | Oxygen is supplied through a central piped system | 1 | 2 |
| 1.3.23 | Oxygen is supplied by oxygen concentrator stored on this unit | 1 | 2 |
| 1.3.24 | Oxygen is supplied in tanks that are stored on this unit | 1 | 2 |
| 1.3.25 | Emergency unit calls for tank of oxygen from central location if needed | 1 | 2 |
| 1.3.26 | Emergency unit calls for oxygen concentrator from central location if needed | 1 | 2 |
| 1.3.27 | Comments: | | |

1.4 Diagnostic Services

Rating: 1 - Generally unavailable, 2 - Some availability, 3 – Adequate (For rating <3, mark all relevant barriers)

[For data entry: code any marked barriers as 1, unmarked barriers as 2]

| | Descriptor | Rating (1-3) | Infrastructure | Absent Equipment | Broken Equipment | Stock out (Supplies) | Training | Personnel | User fees | Opening hours | Other (specify in comments) |
|--|--|--------------|----------------|------------------|------------------|----------------------|----------|-----------|-----------|---------------|-----------------------------|
| Laboratory-based Testing | | | | | | | | | | | |
| 1.4.1 | Hemoglobin | | | | | | | | | | |
| 1.4.2 | Full blood count | | | | | | | | | | |
| 1.4.3 | Coagulation profile (PT/PTT) | | | | | | | | | | |
| 1.4.4 | Electrolytes | | | | | | | | | | |
| 1.4.5 | BUN and creatinine | | | | | | | | | | |
| 1.4.6 | Lipase | | | | | | | | | | |
| 1.4.7 | Cardiac marker (e.g., troponin) | | | | | | | | | | |
| 1.4.8 | Arterial blood gas | | | | | | | | | | |
| 1.4.9 | Cross matching for blood and blood products | | | | | | | | | | |
| 1.4.10 | Blood cultures | | | | | | | | | | |
| 1.4.11 | Capacity to obtain sterile blood samples for lab testing | | | | | | | | | | |
| 1.4.12 | System for reporting lab results in a timely fashion | | | | | | | | | | |
| Point of Care Testing – available in the emergency unit | | | | | | | | | | | |
| 1.4.13 | Urine dipstick | | | | | | | | | | |
| 1.4.14 | Urine pregnancy | | | | | | | | | | |
| 1.4.15 | Glucose | | | | | | | | | | |
| 1.4.16 | Malaria Rapid Diagnostic Test (RDT) | | | | | | | | | | |
| 1.4.17 | Rapid HIV testing | | | | | | | | | | |
| Diagnostic imaging | | | | | | | | | | | |
| 1.4.18 | Stationary X-ray | | | | | | | | | | |
| 1.4.19 | Portable X-ray for use in emergency unit | | | | | | | | | | |
| 1.4.20 | Ultrasound in the hospital | | | | | | | | | | |
| 1.4.21 | Ultrasound for use in emergency unit | | | | | | | | | | |
| 1.4.22 | CT scan | | | | | | | | | | |
| 1.4.23 | System for reporting radiology results in a timely fashion | | | | | | | | | | |
| 1.4.24 | Comments: | | | | | | | | | | |

2. Human Resources

2.1 Emergency Care Clinical Providers

| | | | |
|-------|--|------------|-----------|
| 2.1.1 | Do you have a core of fixed (non-rotating) providers permanently assigned to the emergency unit? | Yes (1) | No (2) |
|-------|--|------------|-----------|

| | Descriptor | Total Number | Number of licensed or certified |
|--|---|--------------|---------------------------------|
| Number of non-rotating providers assigned to emergency unit | | | |
| 2.1.2 | Nurses | | |
| 2.1.3 | Mid-level provider or advance practice nurses (e.g., clinical officers) | | |
| 2.1.4 | Medical officers (doctors without specialist training) | | |
| 2.1.5 | Emergency medicine specialists | | |
| 2.1.6 | Other specialist doctor | | |
| Number of rotating providers assigned to emergency unit | | | |
| 2.1.7 | Nurses | | |
| 2.1.8 | Mid-level provider or advance practice nurses (e.g., clinical officers) | | |
| 2.1.9 | Medical officers (e.g., doctors without specialist training) | | |
| 2.1.10 | Emergency medicine specialists | | |
| 2.1.11 | Other specialist doctor | | |
| 2.1.12 | Comments: | | |

2.2 Consulting Services Available to the Emergency Unit

Rating: 1 - Generally unavailable, 2 - Some availability, 3 - Always available

| | Consulting Service | Rating (1-3) | Comments |
|-------|----------------------|--------------|----------|
| 2.2.1 | General Surgery | | |
| 2.2.2 | OB/GYN | | |
| 2.2.3 | Orthopedics | | |
| 2.2.4 | Anesthesia | | |
| 2.2.5 | Paediatrics | | |
| 2.2.6 | Psychiatry | | |
| 2.2.7 | Other (Please list): | | |

3. Clinical Services

3.1 Access

| | | | |
|-------|---|---------|------------|
| 3.1.1 | What proportion of patients with emergency conditions are brought to the facility by ambulance with formally trained prehospital care providers? | _____ % | Don't know |
| 3.1.2 | Are there regulations and/or protocols mandating that acutely ill or injured patients are clinically triaged prior to being required to register? | Yes(1) | No(2) |
| 3.1.3 | Does the facility require payment prior to provision of initial emergency care? | Yes(1) | No(2) |
| 3.1.4 | Is there an electronic system for registration? | Yes(1) | No(2) |
| 3.1.5 | Comments: | | |

3.2 Triage

| | | Yes | No |
|-------|--|-----|----|
| 3.2.1 | Does this facility use a formal triage system (includes a structured triage tool used by trained personnel 24 hours per day, 7 days per week)? | 1 | 2 |
| 3.2.2 | Are there time targets for each triage category (e.g., YELLOW – seen by provider within 2 hours)? | 1 | 2 |
| 3.2.3 | If there are time targets, is compliance tracked regularly? | 1 | 2 |
| 3.2.4 | Are there specific triage protocols for children <5 years of age? | 1 | 2 |
| 3.2.5 | Are there specific triage protocols for pregnant women? | 1 | 2 |
| 3.2.6 | Are vital signs measured in triage area? | 1 | 2 |
| 3.2.7 | Comments: | | |

3.3 Guidelines, protocols and checklists

| Are the following protocols available at this facility? | | Yes | No |
|--|--|-----|----|
| 3.3.1 | Protocol for systematic triage that ensures patients are seen in order of acuity | 1 | 2 |
| 3.3.2 | Syndromic surveillance guidelines with links to public health officials for case definition and reporting | 1 | 2 |
| 3.3.3 | Clear protocol for communication with hospital administration during times of overcrowding | 1 | 2 |
| 3.3.4 | Emergency unit specific emergency response protocol, including protocol for mass casualty incidents | 1 | 2 |
| Are the following clinical management protocols available at this facility? | | | |
| 3.3.5 | Protocol for initial approach to ABCs (airway, breathing, circulation, etc.) and basic neurologic function | 1 | 2 |
| 3.3.6 | Trauma care checklist | 1 | 2 |
| 3.3.7 | Medical resuscitation checklist | 1 | 2 |
| 3.3.8 | Protocol for neonatal resuscitation | 1 | 2 |
| 3.3.9 | Protocol for volume resuscitation of children and adults | 1 | 2 |
| 3.3.10 | Protocol for adjusting interventions for malnourished patients | 1 | 2 |
| 3.3.11 | Protocol for post-exposure prevention of STI/HIV, emergency contraception, counseling | 1 | 2 |
| 3.3.12 | Protocol for management of labor and delivery in low risk women | 1 | 2 |
| Condition-specific management protocols for: | | | |
| 3.3.13 | Asthma exacerbation | 1 | 2 |
| 3.3.14 | Pneumonia | 1 | 2 |
| 3.3.15 | Maternal hemorrhage | 1 | 2 |
| 3.3.16 | Sepsis | 1 | 2 |
| 3.3.17 | Diabetic ketoacidosis | 1 | 2 |
| 3.3.18 | Other: _____ | 1 | 2 |
| Are the following disposition protocols available at this facility? | | | |
| 3.3.19 | Acuity-based internal transfer protocols to OR or ICU | 1 | 2 |
| 3.3.20 | Protocol for timely disposition from the emergency unit | 1 | 2 |
| 3.3.21 | Protocol for conveying information about discharge or disposition to the patient | 1 | 2 |
| 3.3.22 | Hand-over protocols when transferring patients from one care provider to another | 1 | 2 |
| Are the following outside transfer protocols available at this facility? | | | |
| 3.3.23 | Condition-specific transfer or referral protocols (e.g., criteria for transfer of burn patient to burn centre) | 1 | 2 |
| 3.3.24 | Communication with receiving facility prior to transfer of patients with emergency conditions | 1 | 2 |

| Are the following safety protocols available at this facility? | | Yes | No |
|--|--|-----|----|
| 3.3.25 | Infection prevention and control protocols | 1 | 2 |
| 3.3.26 | Protocol for post exposure prophylaxis for health care workers | 1 | 2 |
| 3.3.27 | Security protocols to protect staff, patients, and infrastructure from violence. | 1 | 2 |
| 3.3.28 | Protocol for managing hazardous exposures (including designated decontamination area) | 1 | 2 |
| 3.3.29 | Containment and disposal of sharps and biomedical waste | 1 | 2 |
| 3.3.30 | Plan to ensure emergency unit staff and patient safety if an incident occurs <i>within</i> the emergency unit (including space, transport, communications) | 1 | 2 |
| 3.3.31 | Comments: | | |

3.4 Ancillary Services

Rating: 1 - Generally unavailable, 2 - Some availability, 3 – Adequate (For rating <3, mark all relevant barriers)
 [For data entry: code any marked barriers as 1, unmarked barriers as 2]

| | Descriptor | Rating (1-3) | Infrastructure | Absent Equipment | Broken Equipment | Stock out (Supplies) | Training | Personnel | User fees | Opening hours | Other (specify in comments) |
|-------|--|--------------|----------------|------------------|------------------|----------------------|----------|-----------|-----------|---------------|-----------------------------|
| | | | | | | | | | | | |
| 3.4.1 | Social work services | | | | | | | | | | |
| 3.4.2 | Patient transport services (within emergency unit) | | | | | | | | | | |
| 3.4.3 | Security | | | | | | | | | | |
| 3.4.4 | Comments: | | | | | | | | | | |

3.5 Quality improvement

| | | Yes | No |
|-------|--|-----|----|
| 3.5.1 | Systematic process for collecting patient data that links condition, management and outcomes (e.g., trauma registry) | 1 | 2 |
| 3.5.2 | Regular meetings convened to use clinical data for quality improvement (e.g., morbidity and mortality conferences, preventable death panels) | 1 | 2 |
| 3.5.3 | Tracking (e.g., clinical audit) to ensure that quality improvement actions (e.g., corrective action) are implemented after review meetings | 1 | 2 |
| 3.5.4 | Clinical document template (e.g., standardized clinical chart) | 1 | 2 |
| 3.5.5 | Has there been a visit to this emergency facility by a supervisor from outside the facility within the last 6 months? | 1 | 2 |
| 3.4.6 | Is there any documentation from the most recent external supervisory visit? | 1 | 2 |
| 3.4.7 | Does the document provide any feedback or comments on some aspect of emergency services? | 1 | 2 |
| 3.4.8 | Comments: | | |

4. Signal Function Performance

(The key informant for this section should be someone with direct involvement in clinical care delivery)

Rating: 1 - Generally unavailable, 2 - Some availability, 3 – Adequate (For rating <3, mark all relevant barriers)

[For data entry: code any marked barriers as 1, unmarked barriers as 2]

| | | Rating (1-3) | Infrastructure | Absent Equipment | Broken Equipment | Stock out (Supplies) | Training | Personnel | User fees | Opening hours | Other (specify in comments) |
|--------------------------------|--|--------------|----------------|------------------|------------------|----------------------|----------|-----------|-----------|---------------|-----------------------------|
| Vital Signs | | | | | | | | | | | |
| 4.1.1 | Are vital signs measured in the triage area? | | | | | | | | | | |
| 4.1.2 | Are vital signs measured in the Emergency Unit? | | | | | | | | | | |
| Airway Interventions | | | | | | | | | | | |
| 4.2.1 | Use of manual maneuvers (e.g., jaw thrust, chin lift) | | | | | | | | | | |
| 4.2.2 | Use of suction | | | | | | | | | | |
| 4.2.3 | Placement of oro- or naso-pharyngeal airway device | | | | | | | | | | |
| 4.2.4 | Placement of supraglottic device | | | | | | | | | | |
| 4.2.5 | Endotracheal intubation | | | | | | | | | | |
| 4.2.6 | Creation of surgical airway | | | | | | | | | | |
| Breathing Interventions | | | | | | | | | | | |
| 4.3.1 | Measurement of pulse oximetry at triage | | | | | | | | | | |
| 4.3.2 | Measurement of pulse oximetry in emergency unit | | | | | | | | | | |
| 4.3.3 | Administration of critical therapies for reactive airway disease | | | | | | | | | | |
| 4.3.4 | Administration of oxygen | | | | | | | | | | |
| 4.3.5 | Bag-valve-mask ventilation | | | | | | | | | | |
| 4.3.6 | Non-invasive mechanical ventilation | | | | | | | | | | |
| 4.3.7 | Invasive mechanical ventilation | | | | | | | | | | |
| 4.3.8 | Perform needle decompression of tension pneumothorax | | | | | | | | | | |
| 4.3.9 | Placement of chest tube | | | | | | | | | | |
| 4.3.10 | Comments: | | | | | | | | | | |

Rating: 1 - Generally unavailable, 2 - Some availability, 3 – Adequate (For rating <3, mark all relevant barriers)

[For data entry: code any marked barriers as 1, unmarked barriers as 2]

| | CIRCULATION | Rating (1-3) | <i>Infrastructure</i> | <i>Absent Equipment</i> | <i>Broken Equipment</i> | <i>Stock out (Supplies)</i> | <i>Training</i> | <i>Personnel</i> | <i>User fees</i> | <i>Opening hours</i> | <i>Other (specify in</i> | |
|-------|--|-------------------------|-----------------------|-----------------------------|-----------------------------|---------------------------------|-----------------|------------------|------------------|----------------------|--------------------------|--|
| | Volume Resuscitation Interventions | | | | | | | | | | | |
| 4.4.1 | Administer oral rehydration | | | | | | | | | | | |
| 4.4.2 | Adjust fluid resuscitation for malnutrition or severe anaemia | | | | | | | | | | | |
| 4.4.3 | Place peripheral IV access | | | | | | | | | | | |
| 4.4.4 | Establish intraosseous access | | | | | | | | | | | |
| 4.4.5 | Perform venous cutdown | | | | | | | | | | | |
| 4.4.6 | Establish central venous access | | | | | | | | | | | |
| 4.4.7 | Administration of IV fluids | | | | | | | | | | | |
| 4.4.8 | Place urinary catheter | | | | | | | | | | | |
| | Control of Bleeding | | | | | | | | | | | |
| 4.5.1 | External control of haemorrhage | | | | | | | | | | | |
| 4.5.2 | Perform packing and/or suture control | | | | | | | | | | | |
| 4.5.3 | Apply arterial tourniquet | | | | | | | | | | | |
| 4.5.4 | Apply pelvic binding or sheeting | | | | | | | | | | | |
| 4.5.5 | Ability to perform safe transfusion (including protocols for appropriate ratios for massive transfusion) | | | | | | | | | | | |
| 4.5.6 | Perform and interpret point of care ultrasound | | | | | | | | | | | |
| | Cardiac Interventions | | | | | | | | | | | |
| 4.6.1 | Perform and interpret ECG | | | | | | | | | | | |
| 4.6.2 | Administer aspirin for ischemia | | | | | | | | | | | |
| 4.6.3 | Perform external defibrillation and/or cardioversion | | | | | | | | | | | |
| 4.6.4 | Perform external cardiac pacing | | | | | | | | | | | |
| 4.6.5 | Administration of adrenaline | | | | | | | | | | | |
| 4.6.6 | Administration of thrombolytics | | | | | | | | | | | |
| 4.6.7 | Perform pericardiocentesis | | | | | | | | | | | |
| | Comments: | | | | | | | | | | | |

Rating: 1 - Generally unavailable, 2 - Some availability, 3 – Adequate (For rating <3, mark all relevant barriers)
 [For data entry: code any marked barriers as 1, unmarked barriers as 2]

| | Neurologic Interventions | Rating (1-3) | <i>Infrastructure</i> | <i>Absent Equipment</i> | <i>Broken Equipment</i> | <i>Stock out (Supplies)</i> | <i>Training</i> | <i>Personnel</i> | <i>User fees</i> | <i>Opening hours</i> | <i>Other (specify in comment)</i> |
|--------|---|------------------------|-----------------------|-----------------------------|-----------------------------|---------------------------------|-----------------|------------------|------------------|----------------------|---------------------------------------|
| | Unconscious patient | | | | | | | | | | |
| 4.7.1 | Protect from secondary injury | | | | | | | | | | |
| 4.7.2 | Check and/or administer glucose | | | | | | | | | | |
| 4.7.3 | Administer insulin for hyperglycemia | | | | | | | | | | |
| 4.7.4 | Perform lumbar puncture | | | | | | | | | | |
| | Seizure | | | | | | | | | | |
| 4.7.5 | Administer benzodiazepine | | | | | | | | | | |
| 4.7.6 | Administer IV magnesium for pregnant patient | | | | | | | | | | |
| 4.7.7 | Administer locally appropriate antidote | | | | | | | | | | |
| | Other | | | | | | | | | | |
| 4.7.8 | Perform mental status examination | | | | | | | | | | |
| 4.7.9 | Management of extreme temperatures | | | | | | | | | | |
| 4.7.10 | Administer appropriate therapeutics for agitation | | | | | | | | | | |
| 4.7.11 | Ability to provide physical restraints | | | | | | | | | | |
| 4.7.12 | Perform procedural sedation | | | | | | | | | | |
| | Comments: | | | | | | | | | | |

| | Sepsis Interventions | Rating (1-3) | <i>Infrastructure</i> | <i>Absent Equipment</i> | <i>Broken Equipment</i> | <i>Stock out (Supplies)</i> | <i>Training</i> | <i>Personnel</i> | <i>User fees</i> | <i>Opening hours</i> | <i>Other (specify in comment)</i> |
|-------|---|------------------------|-----------------------|-----------------------------|-----------------------------|---------------------------------|-----------------|------------------|------------------|----------------------|---------------------------------------|
| 4.8.1 | Administration of IV antibiotics | | | | | | | | | | |
| 4.8.2 | Administration of IV vasopressors | | | | | | | | | | |
| 4.8.3 | Perform diagnostic paracentesis | | | | | | | | | | |
| 4.8.4 | Bedside minor surgical techniques for source control (e.g., abscess, empyema) | | | | | | | | | | |
| | Comments: | | | | | | | | | | |

Rating: 1 - Generally unavailable, 2 - Some availability, 3 – Adequate (For rating <3, mark all relevant barriers)
 [For data entry: code any marked barriers as 1, unmarked barriers as 2]

| | Trauma Interventions | Rating (1-3) | <i>Infrastructure</i> | <i>Absent Equipment</i> | <i>Broken Equipment</i> | <i>Stock out (Supplies)</i> | <i>Training</i> | <i>Personnel</i> | <i>User fees</i> | <i>Opening hours</i> | <i>Other (specify in comment)</i> |
|--------|--|---------------------|-----------------------|-------------------------|-------------------------|-----------------------------|-----------------|------------------|------------------|----------------------|-----------------------------------|
| 4.9.1 | Perform initial appropriate wound care | | | | | | | | | | |
| 4.9.2 | Administer tetanus vaccination or IVIG as appropriate | | | | | | | | | | |
| 4.9.3 | Administer rabies vaccine or IVIG as appropriate | | | | | | | | | | |
| 4.9.4 | Immobilize the cervical spine | | | | | | | | | | |
| 4.9.5 | Immobilize fractures | | | | | | | | | | |
| 4.9.6 | Perform closed reduction of fracture or dislocation | | | | | | | | | | |
| 4.9.7 | Administer antibiotics for open fracture | | | | | | | | | | |
| 4.9.8 | Perform fasciotomy or escharotomy for compartment syndrome | | | | | | | | | | |
| 4.9.9 | Apply three-way dressing for sucking chest wound | | | | | | | | | | |
| 4.9.10 | Administer opiate analgesia | | | | | | | | | | |
| | Comments: | | | | | | | | | | |

| | Obstetric Interventions | Rating (1-3) | <i>Infrastructure</i> | <i>Absent Equipment</i> | <i>Broken Equipment</i> | <i>Stockout (supplies)</i> | <i>Training</i> | <i>Personnel</i> | <i>User fees</i> | <i>Opening hours</i> | <i>Other (specify in comment)</i> |
|--------|---|---------------------|-----------------------|-------------------------|-------------------------|----------------------------|-----------------|------------------|------------------|----------------------|-----------------------------------|
| 4.10.1 | Perform assisted vaginal delivery | | | | | | | | | | |
| 4.10.2 | Administer uterotonic drug (e.g., oxytocin) | | | | | | | | | | |
| 4.10.3 | Perform neonatal resuscitation | | | | | | | | | | |
| | Comments: | | | | | | | | | | |

5.0 Essential Resources for Emergency Care: Equipment and Supplies (INSERT HERE)

Addendum 2: Journal author guidelines (AfJEM)

Available at [Guide for authors - African Journal of Emergency Medicine - ISSN 2211-419X | ScienceDirect.com by Elsevier.](#)

Addendum 3: Research proposal.

**An assessment of emergency care capacity at three hospitals in the Harare
Metropol, Zimbabwe: A descriptive cross-sectional study**

By

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DKXPRI002

*This proposal is submitted in partial fulfilment of the requirements for the Master of
Philosophy in Global Emergency Care in the Faculty of Health Sciences at the University of
Cape Town.*

Supervisor(s): A/Prof, Peter Hodkinson, University of Cape Town

February 2022

Declaration

I, Deka Prince, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce the research either, the whole or any portion of the contents in any manner whatsoever. I further declare the following:

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Background

Emergency medical care is "an integrated platform for delivering accessible, quality, time-sensitive health care services for acute illness and injury across the life course" (1). It is a critical component of a healthcare system and serves as the "reception" for patients in healthcare facilities.

Emergency medical care forms an essential link in the survival of acutely ill patients. It is part of a continuum of care usually initiated by bystanders and continued during transportation by Emergency Medical Services (EMS) until admission into a hospital (2,3). According to WHO, this continuum of care is provided at different levels: prehospital care (care at the scene and en route to fixed facilities) and facility-based care (emergency unit care through to early operative and critical care) (4,5).

Emergencies globally account for 41 million deaths annually and contribute a large percentage of disability-adjusted life years (DALYs) (6). They encompass various time-sensitive conditions, such as traumatic injuries, communicable diseases, pregnancy complications, and acute or decompensated chronic medical and surgical conditions (4). Emergencies require timely recognition and rapid, high-quality emergency interventions to reduce complications, permanent disability, and avoidable deaths (4,7–9).

Despite their great importance, Emergency Care Systems (ECS) still need to be developed globally. This is the case in most low-to middle-income countries (LMICs), where the establishment of emergency medical systems (EMS) is still in the early stages and, more often, non-existent (4,10). Subsequently, these low-income countries experience the highest morbidity and mortality from otherwise preventable acute illnesses and injuries (11,12).

Three-quarters of the population in sub-Saharan Africa is estimated to reside within 2-hour distance from a health facility with the potential to provide emergency care (13,14).

However, most LMICs still need an organised prehospital emergency care service to reach emergency facilities faster. To that effect, critically injured and ill patients in LMICs present late and mostly succumb before reaching the hospitals (10,15). Moreover, most hospitals have limited capacities to manage acutely ill patients. Lack of infrastructure, material

resources, emergency workforce, and poor disaster planning significantly impact the quality of emergency care services (16).

There is a clear need and a massive benefit from improving the capacity to deal with common emergencies in prehospital and hospital-based emergency care settings.

Developing and strengthening emergency care systems in resource-limited settings has substantially reduced preventable morbidity and mortality (17–19). However, a robust ECS cannot be achieved in silos without a commitment to developing the whole healthcare system (18). Therefore, integrating emergency care into the overall healthcare system is paramount in increasing early access to lifesaving emergency care and the likelihood of reducing mortality and disability substantially Reynolds (4,19,20).

The Republic of Zimbabwe is a LMIC in the southern African region. It has a population of 15 million people, with an annual population growth rate of 1.5% (21). Most of the population is rural, with only 38.6% living in towns and cities (21). Zimbabwe has high levels of inequality, and the middle-income class is rapidly shrinking. Its Gross Domestic Product (GDP) per capita is at USD 2,530 as of 2022 statistics (22). However, almost 60% of the people live below the poverty line making Zimbabwe one of the poorest countries in the world (23).

Consequently, Zimbabweans are poor and have little disposable income to purchase health. Zimbabwe's healthcare is the least funded in the southern African region, with only 3.4% of GDP channelled towards public healthcare (22). Healthcare is financed mainly through private organisations, NGOs and out-of-pocket (24). This financing system needs to be more sustainable and cushion the vulnerable.

Like many other Southern African countries, Zimbabwe still struggles with a high burden of maternal, neonatal, communicable, and nutritional diseases, which are pathognomonic of poor healthcare systems (11,25). In addition, there has been a notable epidemiological transition, marked by a shift in disease burden towards trauma and non-communicable diseases over the last decade (26). The shift has ripple effects of increasing healthcare demand on a strained healthcare system with the potential to worsen health indicators.

The state of emergency care in Zimbabwe is mainly unknown. There have yet to be formal research studies to characterise the availability of prehospital and hospital-based emergency care services in Zimbabwe. Very little available information is primarily from local print and electronic media reports. These reports show that the healthcare system has suffered greatly from economic meltdown, deteriorating health facilities and an exodus of the health workforce (27,28). Meanwhile, there has been an increase in demand for emergency care services, especially in urban areas, because of urbanisation and increased road traffic accidents due to bad roads (29).

This research aims to objectively assess emergency care capacity at the three largest hospitals' Emergency Department (ED) in the Harare Metropolitan area using the WHO Hospital Emergency Unit Assessment Tool to develop a larger improvement strategy in these hospitals and Harare Metropol. As shown in the HEAT, several factors or variables contribute to the overall emergency unit's performance. Such variables include the availability of equipment, personnel, stock, infrastructure, training, user fees, opening hours, etc. The unavailability of any critical intervention or service signifies the limited capacity to deliver emergency care (15,30).

This assessment can quickly identify deficiencies in the emergency care delivery system and helps with problem identification and quality improvements (15,30). This will be an initial study that will contribute to the body of knowledge about the state of emergency care at the emergency care facilities in Harare and ideally trigger further research interest in developing ECS.

Aim and Objectives

This study aims to objectively assess the emergency care capacity of Emergency Departments (ED) at three major hospitals in the Harare Metropolitan in order to develop a larger emergency care improvement strategy in these hospitals.

To address this aim, the objectives of this study are to:

- To describe the infrastructure and equipment available at each ED to manage emergencies.
- To describe the functional capacity of the three EDs to manage the commonest life-threatening emergencies.
- To determine the overall service delivery performance of each ED.
- To identify existing barriers to emergency care and gaps in the EDs

Literature review

Continued and renewed efforts to improve emergency care in most African countries have been observed over recent years (10,31). An efficient ECS becomes apparent with the rise in trauma cases in low-income countries and other life-threatening emergencies like stroke and cardiovascular emergencies (30,32). Emergency services become even more critical in pandemics, disasters, and conflicts (33).

The Government of Zimbabwe, through the Zimbabwean National Health Strategy, acknowledges that emergency care is a fundamental human right and that no one should be denied emergency services both in the public and private sectors (34). Since then, there has been growing interest in strengthening emergency care systems in the spirit of universal health coverage and improving healthcare outcomes.

Access to Emergency Care Access.

Emergency care access is defined as “the timely use of services according to need” (20). Ideally, emergency care is accessible if it fulfils three components, affordability,

acceptability, and accessibility (16,20). Affordability is the ability of patients to purchase emergency care without financial hardships (16). Acceptability is determined by the willingness of critically ill patients to seek emergency services and how their needs are met (16). Availability refers to the existence of high-quality ECS within reasonable reach when in need (20).

Although WHO is dedicated to universal access to EC for all, half of the global population remains without access to healthcare services leading to over 500 million individuals being driven into extreme poverty due to healthcare expenses (35). LMICs are seriously affected, with approximately less than 10% of the population in LMICs having access to emergency care, yet there is an enormous burden of emergency conditions (3,36,37).

Access to emergency care varies significantly across and within countries. Sub-Saharan Africa, in particular, carries a disproportional burden of these emergencies, and as such, emergency conditions related to clinical outcomes and mortality are poorer than in other LMICs (38). Obermeyer et al. (2015) observed a mortality of 3.4% in sub-Saharan Africa EDs compared to 1.8% in other LMICs. Poor outcomes in sub-Saharan Africa have been attributed to high patient volumes and poor access to emergency care (40).

ECS in Zimbabwe is challenging to access and infrequently used (34). Emergency care is delivered at different stages and is a continuum of patient care from communities through transportation, ED, and early operative care until admission into critical care. Throughout this continuum, several challenges are observed at all levels of care and stand out as bottlenecks to access (37). In Zimbabwe, like any other LMIC, poor access is evidenced by prolonged EMS response times, delayed arrival at EDs beyond "the golden hour", and high mortality both out of hospital and in the EDs (19,41–43). In addition, patients frequently arrive at the hospital in their private transport, significantly impacting the evolution and outcomes of emergencies (44).

Developing robust emergency care systems is fundamental to addressing Africa's colossal disease burden. In Africa, injuries and preventable diseases carry the highest DALYs compared to the global rates (45). Improving access at all levels of care can significantly impact morbidity and mortality (4). Moresky et al. (2019) noted that emergency conditions

have substantially lower mortality in high-income countries with access to highly efficient ECS compared to LMICs, where systems development is still rudimentary and challenging to access.

Despite having some form of ECS, most African healthcare systems lack the fundamentals of an organised ECS: basic out-of-hospital care and transportation, designated EDs with standardised protocols, and EC providers permanently stationed in EDs (18). Introducing a well-organised emergency care system that implements simple, cost-effective emergency intervention in resource-limited countries could avert 50% of preventable deaths and associated disabilities (16).

Basic out-of-hospital care is the first bottleneck to access in LMICs. Bystanders frequently witness and react to community emergencies first, thus serving as the primary link to ECS. Community-based care is critical in identifying life-threatening injuries and illnesses and initiating management awaiting the arrival of the EMS (46). Unfortunately, in Zimbabwe and other Southern African countries, bystanders are resource constrained and need more basic first-aid skills training (47). Investing in low-cost, adaptable community-based programs, e.g., emergency first aid responder (EFAR) system, significantly increases the chances of survival in community emergencies (47,48).

The second bottleneck to access exists during transportation. Unavailability of the EMS results in delayed initiation of definitive treatment, delayed referral, and longer prehospital times (49). Highly efficient EMS in developed countries have significantly lower mortality than LMICs, where EMS development still needs improvement. Strong evidence suggests a 25% decrease in the risk of dying from trauma and improved functionality considerably among survivors in high-income countries with well-organised prehospital trauma systems (41).

In most cases, when patients fall sick, they may not recognise early emergency indicators, and they do not necessarily know what level of medical care the patient needs, either primary health, surgery, or ICU care. Where prehospital care is inaccessible, patients often present to the nearest or most convenient health facility that may need more resources to

match their immediate care needs (49,50). This costs lives even though lifesaving resources may be available elsewhere in the system.

EMS forms this critical interface that links patients with undifferentiated presentations to appropriate definitive care. Unfortunately, a scarcity of ambulances persists in numerous African countries, particularly in rural areas (31). In many instances, patients are transported from the scene to the hospital using whatever mode of transportation is accessible, often without due consideration for safety (51,52). Utilising properly equipped ambulances for patient transportation minimises delays in transportation and enhances health outcomes (53). Moreover, most LMICs' ambulance services operate without explicit callout and referral protocols and are staffed with unskilled emergency care providers to the detriment of patients (54).

Lastly, Facility-based emergency care that follows a systematic approach of triaging, early recognition of danger signs, and initiation of resuscitation and referral has been associated with mortality reduction in many emergency conditions (4). Also, having a designated ED and standardised protocols for facility-based EC and trained emergency care providers permanently stationed in EDs reduces mortalities in emergency conditions (55).

In conclusion, ECS in Zimbabwe is under-resourced and requires improvement at all levels of care, including care on scene, during transportation, and in health facilities. While resources remain a significant obstacle, there's also a pressing need for more innovative approaches that are simple and cost-effective to enhance the quality of care. Scarce research and evidence in EMS pose challenges in devising new evidence-based guidelines and protocols tailored to the Zimbabwean setting (72). Therefore, there is a pressing need to explore strategies to improve access to high-quality EC.

Emergency Care Assessment

A critical step in strengthening emergency care systems is to assess and compile a detailed overview of the system's functional status. Different elements that constitute emergency medical services (EMS) should be evaluated to inform available infrastructure, resources, and capabilities for delivering patient care. It will also reveal gaps and needs of prehospital

and hospital-based care (30–32,56). These assessments will present an evidence-driven basis for prioritising interventions and help formulate responsive strategies that improve the capacity to provide appropriate emergency care (15).

The World Health Organization (WHO) has been at the forefront of helping countries develop integrated formal emergency care systems. It has called on its member states to prioritise the development thereof at the seventy-second World Health Assembly (1,31). WHO has developed several tools and resources that can be used to develop and strengthen emergency care systems in low and middle-income countries (57). These tools which have been tested and utilised across various regions of the African continent have proven effective in advancing the development of emergency care systems (15,30).

Amongst the tools is the Hospital Emergency Assessment Tool (HEAT). The HEAT was developed mainly from the African Federation for Emergency Medicine's (AFEM) Emergency Care Assessment Tool (ECAT) (30) and other tools relevant to low-income countries (18). Data from other Southern African countries using the HEAT and similar tools like the ECAT is available (30,32,58). Although Zimbabwe shares many similarities with southern African countries, this information may not be adopted for our local hospitals in Harare because of differences in economic and political factors.

The HEAT is a standardised tool that objectively measures hospital-based emergency care capacity. Capacity in this context refers to the overall functional performance of a unit in delivering critical and time-dependent emergency medical interventions (15,59,60). The HEAT still needs to be a public document. However, it has been used in other low-income countries in the Southern African region and has been shown to have both internal and external validity.

Previous studies that used the HEAT to assess facility-based emergency care effectively described the infrastructure, equipment, human resources, and supplies for emergency care delivery in EDs (15,30,55). They also identified the gaps in service delivery and the specific causes of system failures that enable hospital managers to develop targeted change management strategies in developing a robust emergency care delivery system.

A study conducted by Pigoga et al. (2020) identified varied services and emergency care capacities across the government referral hospitals in Eswatini, with most needing proper infrastructure for emergency care, like a designated ED. They also noted that the hospitals had limited supplies, equipment, medications, and skilled emergency care providers necessary to perform critical lifesaving procedures. As such, several opportunities for strengthening Eswatini ECS were identified, such as emergency medicine training, improving the supply chain, and implementing checklists and protocols in EDs.

Methodology

Study design

The study design is a cross-sectional study. This study will give a “snapshot” of Harare's state of emergency care systems. It will allow a quick and cost-effective description of multiple variables, including available resources and hospital-based emergency care capacity. This preliminary data will inform further research to strengthen emergency care systems in Zimbabwe. The WHO has already approved permission to use the HEAT tool for this study, which aligns with their strategies.

Study setting and/or population

The study will be conducted at three referral hospital EDs in Harare, Zimbabwe's capital. The Harare metropolitan district faces significant inequality, with the majority of impoverished patients relying on overcrowded public EDs. According to the 2020 census, Harare's total population is approximately 3 million. (61).

Emergency care services in Harare are provided in both the private and public sectors. Parirenyatwa Group of Hospitals and Harare Hospital are the largest public sector emergency units. These two major hospitals serve as referral centres, providing specialised and subspecialised services across the country. Parirenyatwa Hospital, the largest, has a capacity of 1,800 beds, while Harare Hospital, with 1,200 beds, is the busiest, handling 900 patients daily in its emergency and outpatient units. Most critical emergency cases from all over the country are transferred to Harare, most of which are attended in the public sector (62).

There are also several private healthcare facilities with varied inpatient bed capacities. Harare has ten private hospital EDs with a bed capacity of ten and above and a patient flow of more than twenty patients seen in the ED daily. Healthcare in Zimbabwe has been deteriorating since the 2000s (63), with the private healthcare system generally argued to be more efficient than public hospitals (64,65). As such, a significant number of patients are using private hospitals. However, these facilities are affordable to a minority of high-income earners who can afford to pay cash and those covered by private health insurance. The Avenues Clinic is Harare's biggest private referral hospital, catering for most privately managed emergency medical cases in Harare.

Recruitment and enrolment

A purposive sampling strategy will be used for this initial process, selecting just three of the larger hospitals in Harare. Due to limited time and resources, only three hospitals will be included in the study. Hospitals will be stratified into public and private. The two large public referral hospitals are purposefully included in the study because they serve most of the population in Harare. One private hospital, The Avenues, will be conveniently selected to represent the biggest and busiest private hospitals. Hospital management will be approached at each facility, and once they agree to the study, their help will be sought to identify the key informants needed for the study. Should any hospital not agree to participate, an alternate site will be considered. Alternative sites will be St Annes and Trauma Centre hospitals, purposively chosen for the highest ED presentations per day.

Research procedures and data collection methods.

The study proposal will be sent to each of the selected hospitals' administrations for approval before engaging any participants or any form of data collection. All institutional research protocols laid out by the administrators will be observed to avoid violation of data protection rules and any other legalities.

The HEAT (**Error! Reference source not found.**) will be used as the data collection tool from each ED. This is a standardised tool adopted by WHO mainly from the ECAT (13). This tool has been used in similar settings in low-income countries in southern African countries and it is

valid and reliable (15,30). The HEAT assesses the capacity of hospitals to respond to emergencies. Different sections of the hospital integrate for efficient emergency care delivery. The HEAT has four sections which assess:

1. the hospital's infrastructure
2. human resources
3. availability of clinical services and guidelines
4. emergency units' capacity to deliver key time-dependent interventions for life-threatening emergencies (signal functions) like sepsis, shock, trauma, and obstetric complications. Limited resources in conjunction with the inability to deliver signal functions indicate a gap in emergency care delivery.
5. equipment

The HEAT tool prescribes data collection, including observations and surveys/ interviews with key informants who will be purposefully selected to allow the completion of sections of the HEAT depending on their areas of expertise. Face-to-face meetings with individual key participants will be set up and the HEAT will be administered in the form of an interview. The data will be collected by the primary researcher who doesn't require training on using the HEAT. The primary researcher will fill in the HEAT tool based on the responses from the participants. In addition, the researcher will also make observations and assessments where necessary and record the findings (e.g., identifying if there is a designated waiting area, section 1.3.8 of the HEAT). Covid 19 protocols as necessary will be observed during interviews and throughout the data collection procedure.

Hospital administrators (e.g., medical directors, human resources managers, nursing matron, operations officers, and the hospital information and statistics managers and other support staff) will provide invaluable information and statistical data necessary to complete the first, second, and fifth sections of the HEAT. These sections require objective data to characterise the infrastructure and human resources available at the hospitals' EDs. Hence, these sections don't prescribe multiple, but only necessary key participants to complete all the subsections.

Section three evaluates the availability of protocols, guidelines, and checklists used for emergency care. Availability will be defined as an internal protocol which is physically present and or readily accessible for use during the management of emergencies in the ED. Protocols in the supervisor's offices or computers will be considered unavailable if not accessible by ED staff. Emergency Department (ED) staff serve as the primary informants in this section, with a minimum of three participants being interviewed to enable triangulation of responses, thereby enhancing the accuracy of the findings. Hospital managers will not be interviewed in this section since they may have vested interests.

Key informants for the signal functions section are the staff directly involved in patient management including emergency care providers like doctors and nurses who work in the emergency unit, as well as radiologists and laboratory technicians who are also frequently involved with patient care. Only those who have worked in the departments for more than 3 months will be included in the study. As in section three where the data is subjective, at least 3 participants will be interviewed to improve results accuracy.

Data analysis

The data from the interviews and observations will be entered into the personal password-protected computer of the primary researcher. A backup copy of the results will be kept on a personal google drive account. Data will be cleaned and collated using a Microsoft Excel spreadsheet. In the case of three or more divergent responses to any question in the tool, the modal response will be the final response. The data will be analysed in Excel where simple descriptive statistics like mean, mode, and where applicable, histograms and frequency tables will be generated.

Description of risks and benefits

The research is low-risk and highly unlikely to cause harm or discomfort to any participants. There are no interventions to be carried out on participants. Patients or vulnerable groups of people are not involved in the research and will not contribute any information.

There are no direct benefits to the participants but the society at large. The research is aimed at quality improvements in the delivery of emergency care at hospitals. The research

will evaluate the resources available and identify gaps in delivering emergency care at the hospitals. This crucial information forms the base for crafting feasible interventions and strategies to improve the hospitals' emergency units. Strategies and changes implemented in the emergency care system can be monitored and evaluated based on this initial assessment.

Informed consent process

No participant interviews or any research activity will take place before the proposal is approved by the UCT HREC, Medical Research Council of Zimbabwe, and each hospital's administration. All participants will be given a copy of the HEAT to read through and the primary researcher will summarise it before obtaining written informed consent. All HEAT questions will be explained to the participants before they can answer for clarity. The consent will be written in English and if need be, it can be translated into the local language (Shona). Participants retain their autonomy to decline to answer any question(s) if they feel uncomfortable and to withdraw their consent at any time during the interview.

Privacy and confidentiality

The identity of hospitals will be difficult to anonymise in this study. However, hospitals will be de-identified and only aggregate data will be presented to protect their reputation. The identity of the participants will be anonymised and kept confidential. No other personal information will be collected beyond their role and duration of stay in the department. Information provided by participants will be solely kept by the primary researcher to provide privacy and confidentiality to participants and protect hospitals' reputations. The data will be stored in the researcher's password-protected computer. A backup copy of the results and the thesis will be kept on a personal Google Drive account.

Reimbursement for participation

Participation in this project is voluntary. There will not be any cost incurred by participants to conduct the interviews. The interviews will be done at the earliest convenience for participants.

Strengths and limitations

The strength of this study is that it uses a tool that has already been used in many resource-limited southern African countries and has proved to have internal validity. The tool will assess the hospital's EDs capacity to deliver time-sensitive and life-saving services. The study will identify gaps in the system which is an opportunity for quality improvement. The HEAT tool can also be used internally in both private and public hospitals.

The study is largely based on the knowledge of participants in a particular area. Participants may have interests in the subject matter, especially in reporting shortcomings in the system. This creates bias which can be overcome by independently interviewing multiple participants and statistically reporting responses. The study will be carried out at four EDs in Harare because of logistical costs and timeframe. Results from this study may not be generalizable to show the emergency care capacity in Zimbabwe. A larger sample size that will be drawn from all provinces in Zimbabwe or if possible, exhaustive sampling would overcome this problem for subsequent research.

Dissemination of findings

The research findings will be presented to the University of Cape Town in partial fulfilment of the requirements for the MPhil in Global Emergency Care. The results will also be shared with the hospitals' administration for consideration of the strategies and recommendations for improving emergency care delivery in the units. The research will be considered for submission for peer-reviewed publications.

Timeline

| Task | May-22 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 | Oct-23 | Nov-23 |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| EMDRC | | | | | | | | |
| Institutional approval | | | | | | | | |
| MRCZ approval | | | | | | | | |
| Ethics | | | | | | | | |
| Datat collection | | | | | | | | |
| Datat analysis | | | | | | | | |
| Write-up | | | | | | | | |
| Submaission | | | | | | | | |

Budget

The study is fully self-funded by the student as below.

| Item | Description | Total cost |
|-----------------------------|---|------------|
| Consumables | -printing and photocopying HEAT tool for data collection | US\$ 20 |
| Communications | -Calls and internet | US\$50 |
| Research travel and lunch | -travel to the hospital for data collection | US\$150 |
| Institutional approval fees | -Approval fee | US\$400 |
| Ethics application fee | MRCZ application fee | US\$50 |
| Total | | UD\$670 |

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Addendum 4: Ethics approval letter UCT HREC.



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee



Room 45 E-52-E-Floor- Old Main Building
Groote Schuur Hospital
Observatory 7925
Email: hrec-submissions@uct.ac.za
Website: <https://health.uct.ac.za/home/human-research-ethics>

27th July 2023

HREC REF: 531/2023

A/Prof P Hodkinson
Division of Emergency Medicine
F-51 Old Main Building,
Groote Schuur Hospital
Email: Peter.hodkinson@uct.ac.za
Student: dkxpri002@uct.ac.za

Dear A/Prof Hodkinson

PROJECT TITLE : AN ASSESSMENT OF EMERGENCY CARE CAPACITY AT THREE HOSPITALS IN THE HARARE METROPOL, ZIMBABWE: A DESCRIPTIVE CROSS-SECTIONAL STUDY (MASTER OF PHILOSOPHY IN GLOBAL EMERGENCY CARE - DR PRINCE DEKA)

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

The HREC note that the REC approval from the Medical Research Council of Zimbabwe.

Approval is granted for one year until the 30 July 2024.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

(Forms can be found on our website: <https://health.uct.ac.za/home/human-research-ethics>)

The HREC acknowledge that the student: Dr Prince Deka will also be involved in this study.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the HREC REF 531/2023 in all your correspondence.

Yours sincerely

Signed by candidate

PROFESSOR MARC BLOCKMAN
CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE

HREC REF NO. 531/2023

Addendum 5: MRCZ approval letter.

Telephone: +2638644073772
E-mail: mrcz@mrcz.org.zw
Website: <http://www.mrcz.org.zw>



Medical Research Council of Zimbabwe
20 Cambridge Road
Avondale
Harare
Zimbabwe

APPROVAL

Ref: MRCZ/B/2522

08 June 2023

Prince Deka
2223 Mt Pleasant Heights
Harare

RE: - An Assessment of Emergency Care Capacity at Three Hospitals in The Harare Metropol. Zimbabwe: A Descriptive Cross-Sectional Study

Thank you for the application for the review of research activity that you submitted to the Medical Research Council of Zimbabwe (MRCZ). Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to conduct the above-titled study.

This approval is based on the review and approval of the following documents that were submitted to MRCZ for review: -

- Completed MRCZ 101 new application form
- Full Protocol
- Informed Consent Forms
- Data collection tools

• **APPROVAL NUMBER** : MRCZ/B/2522

This number should be used on all correspondence, consent forms, and documents as appropriate.

- **TYPE OF MEETING** : EXPEDITED
- **APPROVAL DATE** : 08 June 2023
- **EXPIRATION DATE** : 07 June 2024

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ offices should be submitted three months before the expiration date for continuing review.

1. **SERIOUS ADVERSE EVENT REPORTING:** All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices or website.
2. **MODIFICATIONS:** Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
3. **TERMINATION OF STUDY:** On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices or website.
4. **QUESTIONS:** Please contact the MRCZ on Telephone at No. 0864407377203 or by e-mail at mrcz@mrcz.org.zw

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.
- In addition to this approval, all clinical trials involving drugs, devices, and biologics (including other studies focusing on registered drugs) require approval of the Medicines Control Authority of Zimbabwe (MCAZ) before commencement

Yours Faithfully

Signed by candidate

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE



PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

Addendum 6: Avenues Clinic approval letter.

Cnr. Mazowe Street & Baines Avenue • P.O. Box 4880, Harare, Zimbabwe
Tel: (+263) 8677 006175
Email: publicrelations@theavenuesclinic.co.zw
www.theavenuesclinic.co.zw



PRIVATE & CONFIDENTIAL

5 May 2023

Dr Prince Deka
University of Cape Town
Mphil Program
Division of Emergency Medicine
F51 Old Main Building, Groote
Schoor Hospital Observatory
Cape Town 7925

Dear Dr Deka

RE: AN ASSESSMENT OF EMERGENCY CARE CAPACITY AT FOUR HOSPITALS IN THE HARARE METROPOL, ZIMBABWE: A DESCRIPTIVE CROSS-SECTIONAL STUDY

Thank you for submitting the above research proposal which has been considered by the Ethics Committee at The Avenues Clinic. The Committee felt that this was a good research proposal with no issues of ethical concern. The proposal was approved on the understanding that The Avenues Clinic will be duly acknowledged in any publications that will come out of this project.

Yours sincerely,

Signed by candidate

PROFESSOR GODFREY I. MUGUTI
MS(Syd) FRCS (Edin) Hon. FRCS(Eng)
MEDICAL DIRECTOR

c.c. Chief Executive Officer
Principal Nursing Officer



THE TRUSTED HEALTH PARTNER

F. Mungoni (Chairman), S. Ndhlovu (General Manager), R.C.D. Chitengu, G.I. Muguti,
A. Makamure, N. Moyo, V.L. Ndhlovu

Addendum 7: Harare Central Hospital approval letter.

Telephone: 621100-19
Fax: 621157

Reference: SMCHEC280323/47

SALLY CENTRAL MUGABE HOSPITAL
P. O. BOX ST 14
SOUTHERTON
HARARE
ZIMBABWE



20 April 2023

Dr Deka Prince
2223 Mt Pleasant Heights
Harare

REF: AN ASSESSMENT OF EMERGENCY CARE CAPACITY AT FOUR HOSPITALS IN THE HARARE METROPOL, ZIMBABWE: A DESCRIPTIVE CROSS- SECTIONAL STUDY

I am glad to advise you that your application to conduct a study entitled: **AN ASSESSMENT OF EMERGENCY CARE CAPACITY AT FOUR HOSPITALS IN THE HARARE METROPOL, ZIMBABWE : A DESCRIPTIVE CROSS- SECTIONAL STUDY** (Ref: SMCHEC280323/47), has been approved by the Sally Mugabe Central Hospital Ethics Committee.

This approval is premised on the submitted protocol. Should you decide to vary your protocol in any material way please submit these for further approval.

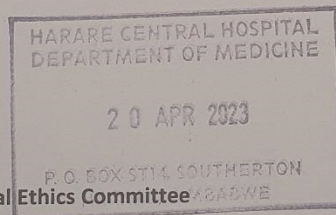
You are advised to avail the results of your study whether positive or negative to the hospital through the committee for our information.

Yours sincerely,

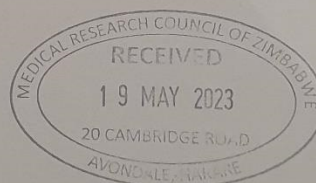
Signed by candidate

DR. C. Pasi

Chairman Sally Mugabe Central Ethics Committee




Board Members, Chairman Dr E Chagonda, Deputy Chairperson Ms A Mashamba, Members:- Mr J Makiya, Mrs P Sibanda, Mr. S. Hlatywayo, Dr C. Pasi (Chief Medical Officer)



Addendum 8: Parirenyatwa Group of Hospitals approval letter.

All communications should be addressed to
"THE GROUP CHIEF EXECUTIVE"
Telephone: 701520-701554/7
Fax: 706627
Website: www.parihosp.org



PARIRENYATWA GROUP OF HOSPITALS
P.O Box CY 198
Causeway
Zimbabwe

31 March 2023

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH STUDY AT
PARIRENYATWA GROUP OF HOSPITALS - PRINCE DEKA

The above matter refers.

The Parirenyatwa Group of Hospitals hereby grants you permission to conduct research on:-

An assessment of emergency care capacity at Parirenyatwa hospital in the Harare Metropol, Zimbabwe. A descriptive cross-sectional study.

The permission is granted subject to the following conditions:-

1. The researcher will provide all sundries necessary for sample collections.
2. The researcher sponsors all payments for the tests involved.
3. The hospital incurs no cost in the course of the research.
4. All relevant departments are notified in advance and the Head of section/ward signs acknowledgement of such notification.
5. The conduct of the research does not interfere or interrupt the daily service provision by the hospital.
6. Formal written feedback on research outcomes must be given to the Director of Clinical Services.
7. Permission for publication of research must be obtained from the Director of Clinical Services.

Signed by candidate

DR T. M. MAGURE
ACTING CLINICAL DIRECTOR

