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## ORIGINAL RESEARCH

### Ambulance or taxi? High acuity prehospital transports in the Ashanti region of Ghana



#### *Ambulance ou Taxi? Le transport préhospitalier des patients gravement malades dans la région d'Ashanti au Ghana*

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**Introduction:** African emergency medical services (EMS) systems are inadequate, thereby necessitating its selective use. This study aims to investigate differences in mode of arrival to the Emergency Centre (EC) at Komfo Anokye Teaching Hospital in Kumasi, Ghana by acuity, injury and referral status.

**Methods:** A cross-sectional survey was conducted in the EC at the Komfo Anokye Teaching Hospital (KATH) in Kumasi, Ghana, in 2011. A survey was administered to all patients triaged to the EC. Patients were excluded if they were under 18 years of age, unable to communicate in English, Twi, or Fante, had altered mental status, or were deceased. Data were inputted into an excel spread sheet and uploaded to SPSS. Descriptive statistics were computed. Inferential statistics were performed testing for differences and associations between modes of arrival and acuity level, referral and injury status.

**Results:** Of the 1004 patients enrolled, 411 (41%) had an injury-related complaint, and 458 (45.6%) were inter-facility transfers ("referrals"). 148 (14.8%) arrived by ambulance, and 778 (77.6%) non-ambulance (38% private cars, 38% taxis). 67 (6.7%) were triaged as Red, 276 (27.5%) as Orange, and 637 (63.4%) as Yellow (highest to lowest acuity). Ambulance arrival was positively associated with a higher triage score (OR: 1.53). Patients referred from other facilities were almost twice as likely (OR 1.92) to arrive at the KATH EC via ambulance than those not referred. Patients with injuries and higher acuities patients were more likely to be transported to KATH by ambulance (OR 1.86 and 1.87 respectively). All results are highly statistically significant.

**Conclusion:** Although a minority of patients were transported by ambulance, they represented the most acute patients arriving at the KATH EC. Given the limited availability of EMS resources and ambulances in Ashanti, selective ambulance use appears warranted and should inform prehospital care planning.

**Introduction:** Les services d'aide médicale d'urgence (SAMU) en Afrique sont inadéquats, ce qui nécessite par conséquent de les utiliser de manière sélective. L'objectif de cette étude est de se pencher sur les différences dans le mode d'arrivée aux urgences de l'hôpital universitaire Komfo Anokye à Kumasi, au Ghana, en fonction de la gravité, du type de blessure et d'orientation.

**Méthodes:** Une étude transversale a été réalisée au services des urgences de l'hôpital universitaire Komfo Anokye (KATH) à Kumasi, au Ghana, en 2011. Une enquête a été menée auprès des patients orientés vers le service des urgences. Les patients âgés de moins de 18 ans, qui ne pouvaient communiquer en anglais, en Twi ou en Fante, souffrant de troubles mentaux ou décédés ont été exclus de l'étude. Les données ont été saisies dans un tableur Excel et téléchargées dans SPSS. Des statistiques descriptives ont été calculées. Des statistiques inférentielles ont également été calculées afin de tester les différences et associations entre les moyens de transport pour se rendre aux urgences et le degré de gravité, le type d'orientation et de blessure.

**Résultats:** Sur les 1 004 patients inclus dans l'étude, 411 (41%) souffraient d'une blessure, et 458 (45,6%) correspondaient à des transferts hospitaliers (orientations). Cent quarante-huit (14,8%) étaient arrivés en ambulance, et 778 (77,6%) par un autre moyen de transport (38% en véhicule privé et 38% en taxi). Soixante-sept (6,7%) ont été classés en rouge, 276 (27,5%) en orange et 637 (63,4%) en jaune (de la gravité la plus forte à la moins forte). L'arrivée en ambulance était positivement associée à une note de classement plus élevé (RC: 1,53). Les patients orientés vers les urgences depuis d'autres structures de santé étaient presque deux fois plus susceptibles (RC: 1,92) d'arriver aux urgences du KATH en ambulance que ceux qui n'avaient pas été orientés. Les patients souffrant de blessures ou d'états physiques plus graves étaient davantage susceptibles d'être transportés au KATH en ambulance (RC 1,86 et 1,87 respectivement). Tous les résultats sont statistiquement très significatifs.

**Conclusion:** Bien qu'une minorité de patients était transportée par ambulance, ces derniers représentaient les patients arrivant aux urgences du KATH présentant l'état physique le plus grave. Étant donné la disponibilité limitée des ressources et ambulances du SAMU à Ashanti, l'utilisation sélective des ambulances s'avère nécessaire et devrait informer la planification des soins préhospitaliers.

#### African relevance

- Emergency medical services (EMS) systems in Africa are currently inadequate to provide services to all citizens.
- Timely and effective prehospital transport is needed to improve patient outcomes.

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- The inadequacy of EMS systems in Africa has necessitated the ubiquitous use of commercial and private vehicles for emergency medical transportation.

## Introduction

The care of the acutely ill or severely physically injured patient occurs on a continuum. To minimize morbidity and mortality, emergency care should begin at the scene of the incident and end in a definitive care facility. Prompt and effective prehospital transport represents a critical link in this sequence of care.

The African continent bears a disproportionately large burden of death and disability from emergency conditions such as traumatic injuries (secondary to road traffic collisions), obstetric complications including post-partum haemorrhage and arrested labour, sepsis, shock, and paediatric acute respiratory and diarrheal illnesses. The World Health Organization (WHO) reports that Africa has the highest mortality rate from road traffic crashes (32.2 per 100,000 population), nearly double of that in North America.<sup>1</sup>

Reasons for the disproportionately poorer outcomes of patients with emergency medical conditions in Africa are multifactorial. Timely and effective prehospital transport is needed to improve patient outcomes.<sup>2-4</sup> In Ghana, excess mortality of severely injured patients has been specifically attributable to the lack of formal prehospital emergency care systems.<sup>5</sup>

WHO supports the development of sustainable, locally-appropriate prehospital care systems to mitigate death and disability, in part through the implementation of emergency medical services (EMS) systems which can provide formal emergency medical transport with trained prehospital providers.<sup>6</sup> Unfortunately EMS remains a scarce healthcare resource in Africa. Where EMS systems exist, they are inadequately developed to meet the growing needs for emergency care.<sup>7</sup>

The inadequacy of EMS systems in Africa has necessitated the ubiquitous use of commercial and private vehicles for emergency medical transportation.<sup>7</sup> However, the safety profile and outcomes of patients transported urgently or emergently by such informal means have not been widely studied.

Ghana is a lower-middle income sub-Saharan African nation of 25 million people.<sup>8,9</sup> The Ashanti region, the most densely populated and centrally located geo-political region of Ghana, bears a large national burden of morbidity and mortality due to emergency medical conditions.<sup>10,11</sup> Kumasi, the largest city in the Ashanti region, is home to Komfo Anokye Teaching Hospital, the major referral centre in the region. In Ashanti, 2 parallel ambulance systems operate: the government owned and operated National Ambulance Service (NAS), and hospital-managed Facility-Based Ambulance System (FBAS).<sup>12</sup>

NAS is Ghana's only formal EMS agency. In 2011, 70 internally trained NAS emergency medical technicians (EMTs) delivered essential prehospital care in 5 well-equipped ambulances in the Ashanti region. Of the 2000 Ashanti region patient transports per year, over 60% were inter-facility transfers (IFTs), mostly for obstetric and traumatic emergencies [Personal Communication, Ahmed Zakariah]. The clinical outcomes of NAS-transported patients are unknown.

In 2011, Ashanti's FBAS included 13 ambulances each stationed at and operated by a government District Hospital. These hospitals semi-autonomously managed and operated

the ambulances to meet individual facility transfer needs. General nurses, rather than specifically trained prehospital providers, occasionally accompanied transported patients. FBAS ambulances contained little to no WHO-recommended prehospital equipment or medications. The case types, volume and outcomes of patients transported via FBAS remain unstudied.

Despite existing EMS resources, Ghanaian studies indicate that the majority of acute patient transports are executed with non-ambulance means. One study in the Greater Accra Region found that 59.3% of referred obstetric patients self-transported by taxi.<sup>13</sup> The acuity level, safety and outcomes of these informal transports conducted in Ghana also remain unknown. In this study, we aim to characterize and compare ambulance to non-ambulance transported patients who arrived in the emergency department of a tertiary care hospital in Ghana.

In line with previous Ghanaian and African studies citing predominantly informal means of emergency transport, we hypothesize that a minority of all patients will arrive at the Komfo Anokye Teaching Hospital (KATH) Emergency Centre (EC) via ambulance, with the majority utilizing non-ambulance means of transport. Secondly, due to the limited number of ambulances in the Ashanti region and a high volume of physician-initiated ambulance transports, we also postulate that severely injured and ill patients will be more likely to be ambulance-transported than lower acuity patients.

## Methods

This cross-sectional study was conducted in the EC at KATH in Kumasi, Ghana. This tertiary care facility provides injury and emergency care to the residents of Kumasi (population 1.4 million) and the surrounding Ashanti region (population 4.4 million). This academic emergency department's patient volume is 27,000 visits per year and functions as the referral centre for the northern two-thirds of the country.

Potential participants included all patients seeking care in the EC at KATH who were able to give informed consent or have family give informed consent if under 18 years of age. Inclusion criteria were any patient presenting to KATH EC between July 13, 2011 and August 12, 2011. The study was conducted in 8-h shifts from 8:00 a.m. to 4:00 p.m., 12:00 p.m. to 8:00 p.m. and 4:00 p.m. to 12:00 a.m.

At the beginning of the 8:00 a.m. shift, research assistants (RAs) consulted the log book in the triage area to ascertain how many patients sought care between midnight and 8:00 a.m. These patients were located within the EC and surveyed. Questionnaires were administered in all zones of the EC. Patients were excluded if they were under 18 years of age without a parent or guardian available to consent, were unable to understand English, Twi, or Fante, or if translation services for Twi or Fante were unavailable, had altered mental status, were in need of immediate resuscitative care, were sedated, or were admitted or deceased before the survey was completed.

Study procedures were approved and conducted in compliance with the Committee on Human Research Publication and Ethics, School of Medical Sciences, Kwame Nkrumah University of Science and Technology and the University of Michigan Institutional Review Board for Human Subjects guidelines.

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