Interhospital Transport of the Critically ill Patient: The University of Uyo Teaching Hospital Experience

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ABSTRACT

Interhospital transport of very ill patient has continued to be a major shortcoming in our management of patients in the intensive care unit (ICU) of the University of Uyo Teaching Hospital. Getting this process right will go a long way in improving the quality of care rendered to this special group of patients. This study seeks to assess how closely our present practice adhere to established guidelines and also highlights the problems hindering efficient interhospital transport of critically ill patients in our institution. This was a retrospective study of all critically ill patients transported from the ICU of University of Uyo Teaching Hospital between January 2009 and April 2015. Patients' data were obtained from ICU records. Data included Sex, Age, Diagnosis, Time interval between decision to transfer and actual transfer (Decision/Transport interval), Reason for transfer, Accompanying personnel, Appropriateness of Equipment, Mode of transfer and Type of vehicle. Descriptive statistics were used to analyze data. Chi-square test was to determine significance between variables. A p value of < 0.05 was considered significant. All data was analysed using IBM-SPSS 22.0.0.0. Fifteen critically ill patients were transported within the study period. There were more males 12(80%) than females 3(20%): a male to female ratio of 4:1. The age range was between 11-81 years with a mean of 51.1years. Neurosurgical (Severe head injury and spinal cord injury) patients constituted a majority 7(46.7%) of those transported. Ten (66.7) patients were transported for reason of lack of expertise. The decision/transport interval ranged between 1-4 days. A physician/nurse, or physician/anaesthetic technician, team accompanied patients only on 4(26.6%) occasions. A single technician was the accompanying personnel on 6(40.0%) occasions. Equipment for the transport of patients was found to be appropriate in only 3(20.0%) cases. While land transport (80%) was the dominant mode of transport, private cars were used to transport 7(46.7%) of the patients. An ambulance was used only 4(26.7%) times for transport to the referral hospital. It is obvious from this study that our practice is a far cry from the minimum acceptable standards from available guidelines. There is a need for adherence to established protocols when transporting critically ill patienta to enhance safety. There is an urgent need to establish a neurosurgical unit and a transport team with appropriate equipment and protocols. Every aspect of the transport process must be looked into including documentation, communication and the welfare of the transport team.

Keywords: Interhospital transport, intensive care unit, University of Uyo Teaching Hospital

INTRODUCTION

Interhospital transport of the critically ill patient is not limited to facilities in resource-limited settings like ours. In the USA, 5% of patients requiring ICU care are transported to another hospital[1]. As long as there is a lack of the service, procedure, expertise, etc., needed by the critically ill patient, there will always be a reason for transfer to another hospital. However, since the transport of the critically ill patient is not without specific ricks of morbidity and mortality[2], the decision to transfer must be based on a thorough assessment of the potential benefits of transport weighed against the potential risks. These risks can be minimized and outcome improved with careful planning, the use of appropriately qualified personnel, and selection and availability of appropriate equipment[3]. The outcome of this study will go a long way in identifying the common reasons for transfer, the establishment of an appropriately equipped transport team with protocols for the transport of the critically ill patient.

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MATERIALS AND METHODS

This was a retrospective of all interhospital transport of critically ill patients from the general ICU of University of Uyo Teaching Hospital between January 2009 and April 2015. Patients' data were obtained from ICU records. Data collected included Sex, Age, Diagnosis, Decision/Transport Interval, Reason for transfer, Accompanying personnel (physician, ICU nurse, anaesthetic technician), Appropriateness of Equipment (Appropriate e.g. pulse oximeter, blood pressure monitor,

electrocardiogram, etc, or Not Appropriate e.g. pulse oximeter only), Mode of transport (i.e. whether land or air) and Type of vehicle (i.e. private car, bus, ambulance or aircraft). Descriptive statistics were used to analyze data. Pearson Chi-Square test was used to determine relationship between variables. AP value of <0.05 was considered significant. All data was analysed using IBM-SPSS 22.0.0.0.

RESULTS

Fifteen critically ill patients were transported within the study period. There were more males 12(80%) than females 3(20%): a male: female ratio of 4:1. The age range was between 11-81 years with a mean of 51.1years. The decision/transport interval ranged between 1-4 days; with most patients 7(46.7%) transported a day after decision was made (Table 1). A physician/nurse or physician/technician team accompanied patients only on 4(26.6%) occasions (Table 2). A single technician was the accompanying personnel on 6(40.0%) occasions (Table 2).

Equipment for the transport of patients was only found to be appropriate in 3(20.0%) of cases (Table 1). While land transport (80%) was the dominant mode of transport, private cars were used to transport 7(46.7%) of the patients (Figure 1). An ambulance was used only 4(26.7%) times for transport to the referral hospital (Figure 1), and 3(20.0%) times to the airport. On three (20.0%) occasions two fixed wing, and one rotary wing, aircraft were used for transport.

Neurosurgical (Severe head injury and spinal cord injury) patients constituted a majority 7(46.7%) of those transported. Ten (67%) patients were transported for reason of lack of expertise. On 4(26.7%) occasions, requests from family members were the reasons for the transport of patients. There was no statistical significant association between the reason for transport and the diagnosis of the patient (Figure 2).

Table 1: Cross Tabulation of Decision/Transport Interval and Appropriateness of Equipment

			Appropriateness of Equipment		
			Appropriate	**Not Appropriate**	**Total**
Decision/Transport Interval (Days)	1	Count	2	5	7
		% of Total	13.3%	33.3%	46.7%
	2	Count	0	5	5
		% of Total	0.0%	33.3%	33.3%
	3	Count	1	1	2
		% of Total	6.7%	6.7%	13.3%
	4	Count	0	1	1
		% of Total	0.0%	6.7%	6.7%
Total		Count	3	12	15
		% of Total	20.0%	80.0%	100.0%

Table 2: Cross tabulation of Accompanying Personnel and Appropriateness of Equipment

			Appropriateness of Equipment		
			Appropriate	**Not Appropriate**	**Total**
Accompanying Personnel	Physician/Nurse	Count	2	0	2
		% of Total	13.3%	0.0%	13.3%
	Physician/Technician	Count	1	1	2
		% of Total	6.7%	6.7%	13.3%
	Nurse/Technician	Count	0	5	5
		% of Total	0.0%	33.3%	33.3%
	Technician only	Count	0	6	6
		% of Total	0.0%	40.0%	40.0%
	Total	Count	3	12	15
		% of Total	20.0%	80.0%	100.0%

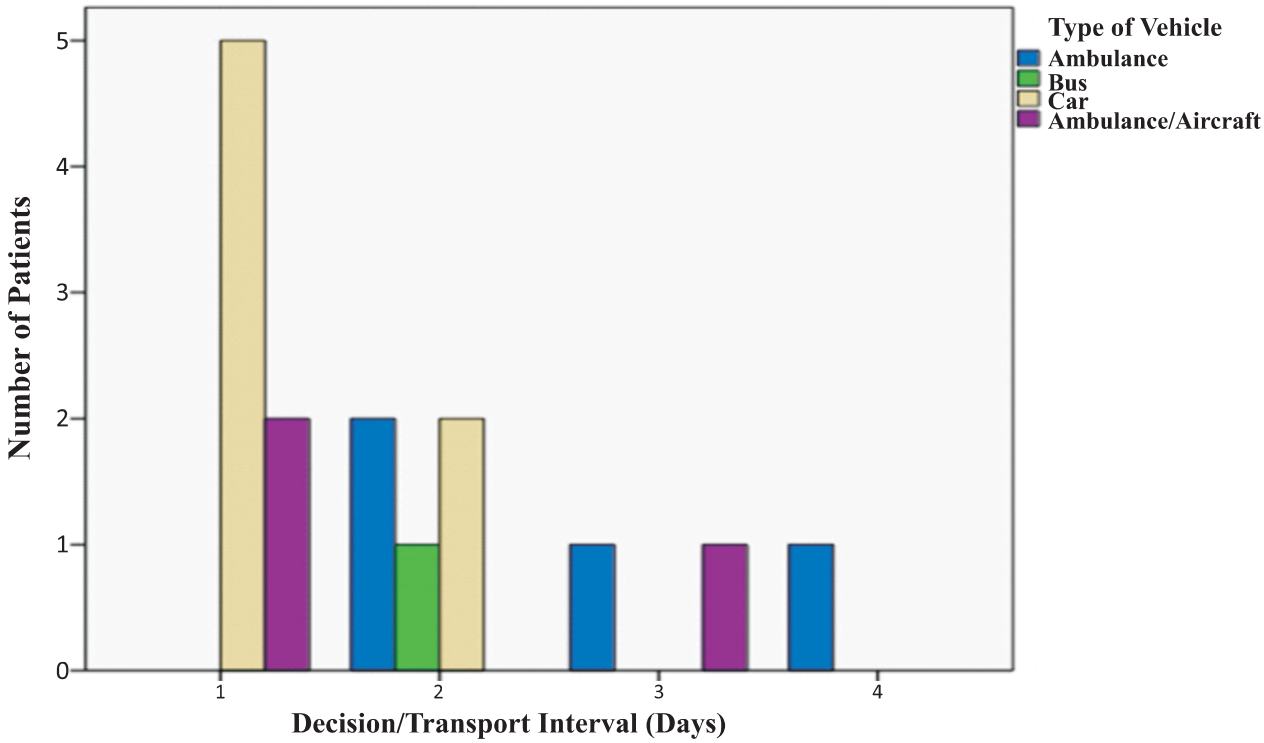

Figure 1: Bar Chart of Decision/Transport Interval and Type of Vehicle

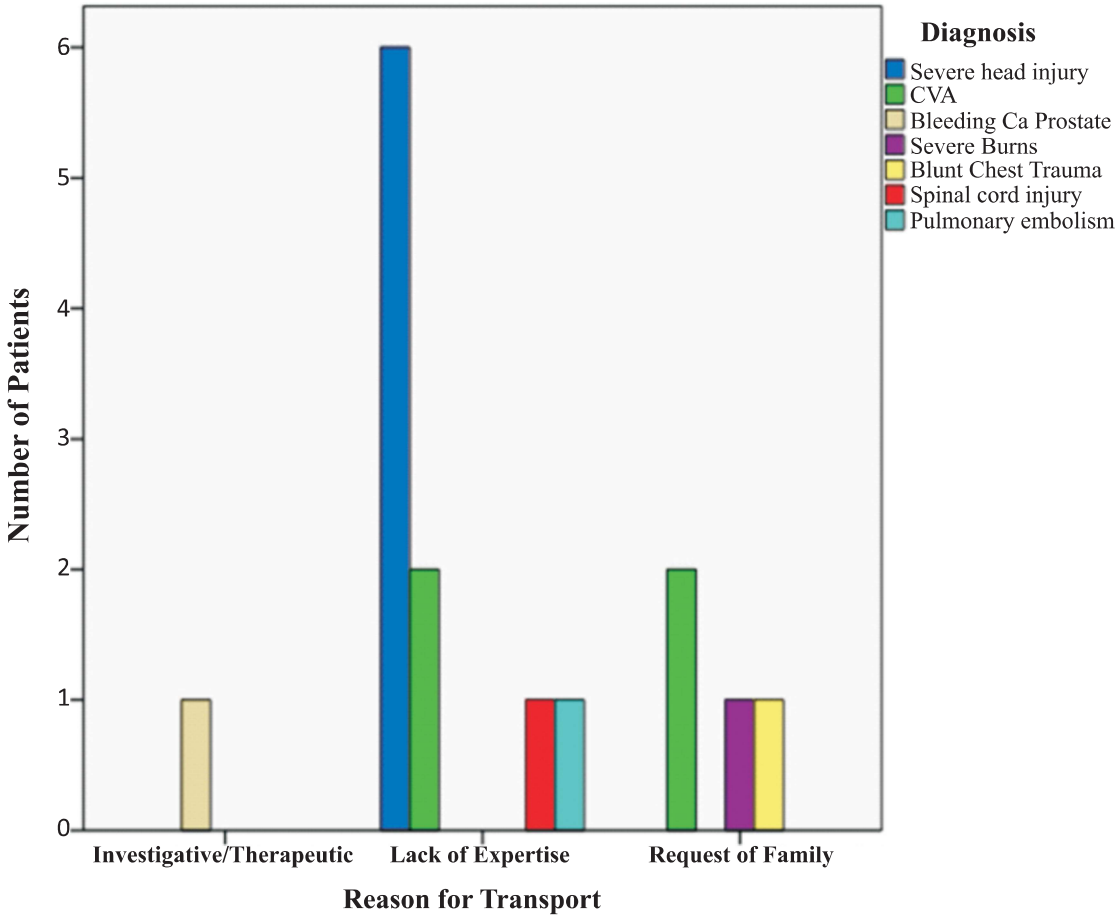

Figure 2: Bar Chart of Reason for Transport and Diagnosis

DISCUSSION

Murphy's Law aptly illustrates transport of the very ill patient: 'if anything can go wrong, it will'[4]. This statement emphasizes the need for careful planning and coordination in terms of personnel, equipment, and consideration of the overall benefit of the transport to the critically ill patient. While no mortalities were recorded in the fifteen cases in this study, no proper records were kept regarding adverse events in all the transported patients.

Droogh *et al.*[4] found inexperience of the medical escorts, duration of the transport and the pre-transfer illness and injury severity to be proportional the incidence of adverse events. Regardless of the risk involved, there is enough evidence to show that the transport of the very ill patient will still be a necessity as long as there is a supply and demand shortfall in expertise and equipment. A recent study by Kahn et al[5] in the USA seems to suggest that the lives of 4,000 patients in a year would have been saved had they been transferred to a better hospital.

Severe head injured patients constituted a majority of the transported cases. This could be explained by the fact that the University of Uyo Teaching Hospital does not have a neurosurgical unit, limiting the trauma team to diagnosis and stabilization of head injured patients. Failure or delay to diagnose intracranial haematomas remains a major cause of morbidity and mortality following head injury. Early recognition and transfer of patients at risk to specialist neurological centers must be the goal[6].

Several studies have shown that early identification and evacuation of intracranial haematomas reduces mortality[7, 8]. There is however still a conflict between rapid referral and transport of selected cases and the need for thorough assessment, resuscitation and monitoring before transfer. This may not entirely explain the relatively long mean decision/transport interval in this study of 1.8days. The study also revealed that there was no significant association between these decision/transport intervals and the quality of the accompanying personnel, the appropriateness of equipment and the type of vehicle used.

There was a significant association between the accompanying personnel and the appropriateness of the equipment ($p<0.05$); the more competent the accompanying personnel the more appropriate the equipment. This cannot be said to be very good for most of the patients as a physician was only part of the transport team 26.6% of the time. A greater percentage of the patients were therefore at the mercy of a poorly equipped single technician.

In their study, Fried *et al.*[9] recommended that, in addition to the driver of the vehicle, a minimum of two people should accompany the transport of the critically ill patient. The team can be a combination of physicians, nurses, respiratory therapists, and paramedics, with each being skilled in advanced airway management and advanced cardiac life support. This was grossly lacking in our case as only a single technician was the accompanying personnel on six occasions and equipment for transport of patients was only found to be appropriate in three out of the fifteen cases.

It may seem established that transport of the critically ill patient is best done by special retrieval team[10]. In their retrospective reviews of all transfers over one year, Bellingan *et al.*[10] undertook to evaluate the effect of transfer method on acute physiology (within 2hours of ICU admission) and early mortality (<12hours after ICU admission). They concluded that the use of a specialized retrieval team may significantly improve the acute physiology of critically ill patients and may reduce early mortality in the ICU. This study also showed that a specialized retrieval team from the referral hospital might be better than a specialized transfer team of the referring hospital

Nonetheless, the review by Droogh *et al.*[4] in 2006 concluded that insufficient data existed to determine whether the use of specialist transport personnel improves patient outcome. This institution does not presently have specialized transfer team. Accompanying personnel are volunteers (senior/junior resident anaesthetists, ICU nurses and anaesthetic technicians) with no form of travel insurance cover. Instances abound of accompanying personnel becoming stranded at the receiving hospitals.

Of the fifteen patients transported, one was intubated and manual ventilated with the aid of a tabletop anaesthetic machine. This was not ideal but was necessitated by the absence of a mobile ventilator in our institution. Until several years ago, manual ventilation was the preferred method for patient transport, owing to the poor performance of transport ventilators[11]. This method however, presents another set of problems including the inability to control airway pressure and/or tidal volume, resulting in hyper- or hypoventilation, and the possibility of inducing

or exacerbating lung injury[12]. Additionally, the maintenance of a stable PEEP is problematic, and spontaneous breathing is difficult[12].

Air transport was used only three times (two-fixed wing and one rotary wing aircraft) in this study. While studies have shown that air transport was time saving, this saving can be offset by mobilization time and the need for additional ground transport between landing site and hospital[4]. A rotary wing aircraft could not be used during the study period because the heliport in our institution was not technically sound.

Interestingly, private cars and bus were used in the transport of eight of the fifteen critically ill patients in this study. This could be attributable to the difficulty in mobilization, and constant break down, of the few available ambulances in our centre. There is an urgent need for a reorganization of the ambulance service of the hospital. Equipment was not appropriate in all of them and no physician was part of the transport team during the use of these types of vehicle. Quite a few recommendations regarding minimum transfer equipment have been made[13,14]. These focus not only on the continuation of normal critical care (like monitoring, ventilation, administering medication), but also on transfer-specific items (gas supply, batteries) and incident management (defibrillator, chest tubes)[4]. Only the hospital ambulances were appropriately equipped to the level of these guidelines.

CONCLUSION

It is obvious from this study that our practice is a far cry from the minimum acceptable standards from available guidelines. There is a need for adherence to established protocols in the transfer of the critically ill patient to enhance safety. This therefore implies an overhaul of every aspect of the transport process that include documentation, communication, and the establishment of a neurosurgical unit and a well-equipped and motivated transport team.

REFERENCES

1. Iwashyna TJ, Christie JD, Kahn JM, Asch DA. Uncharted paths: hospital networks in critical care. Chest 2009;135:827-33
2. Blumen IJ, Abernethy MK, Dunne MJ. Flight physiology. Clinical considerations. Crit Care Clin 1992;8:597-618
3. Olson CM, Jastremski MS, Vilogi JP, et al. Stabilization of patients prior to interhospital transport. Am J Emerg Med 1987;5:33-39
4. Droogh JM, Smit M, Absalom AR, Ligtenberg JJM, Zijlstra JG. Transferring the critically ill patient: are we there yet? Critical Care 2015;19:62
5. Kahn JM, Linde-Zwirble WT, Wunsch H, Barnato AE, Iwashyna TJ, Roberts MS, et al. Potential value of regionalized intensive care for mechanically ventilated medical patients. Am J Respir Crit Care Med 2008;177:285-91
6. Dun LT. Secondary insults during the interhospital transfer of head-injured patients: an audit of transfers in the Mersey Region. Injury 1997;28(7):427-431
7. Mendelow AD, Karmi ZM, Paul KS, et al. Extradural haematoma: effect of delayed treatment. BMJ 1979;1:1240
8. Seelig JM, Becker DP, Miller JD. Traumatic acute subdural haematoma. Major mortality reduction in comatose patients treated within four hours. N Engl J M 1981;304:1211
9. Fried MJ, Bruce J, Colquhoun R, Smith G. Inter-hospital Transfers of acutely ill adults in Scotland. Anaesthesia 2010;65(2):136-144
10. Bellingan G, Olivier T, Batson S, Webb A. Comparison of a specialist retrieval team with current United Kingdom practice for the transport of critically ill patients. Intensive Care Med 2000,26:740-744
11. Attebo L, Bengtsson M, Johnson A. Comparison of portable emergency ventilators using a lung model. Br J Anaesth 1993;70(3):372-277
12. Blakeman TC, Branson RD. Inter- and Intra-hospital Transport of the Critically Ill. Respir Care 2013;58(6):1008-1021
13. Guidelines for the transfer of critically ill patients. Guidelines Committee of the American College of Critical Care Medicine; Society of Critical Care Medicine and American Association of Critical-Care Nurses Transfer Guidelines Task Force. Crit Care Med. 1993;21:931-937.
14. Warren J, Fromm RE, Orr RA, Rotello LC, Horst HM, American College of Critical Care Medicine. Guidelines for the inter- and intrahospital transport of critically ill patients. Crit Care Med. 2004;32:256-62.