Abstract

Objective: To describe some aspects of the quality of ambulance care and completeness of information in the transfer forms of emergency patients who arrived in ambulances to the National Hospital of Sri Lanka.

Methods: This was a descriptive study. All ambulances arrived at the NHSL during the study period with an emergency patient were selected (n=409) and from those 250 transfer forms, which could be traced were taken. An interviewer-administered questionnaire was used for ambulance staff. A Checklist, which has been derived from the standard patent chart, was used to determine the availability of information on transfer forms.

Results: Of the 409 ambulances, the patient was accompanied by a doctor in 4% (n=16), a nurse in 4% (n=15) and Emergency Medical Technicians (EMTs) in 1% (n=4), and there were 675 minor employees and 409 drivers. Twenty six percent (n=4) of doctors, 12.5% (n=2) of nurses, 100% (n=4) of EMTs, 56.9% (n=189) of drivers and 24.3% (n=164) of minor employees had received training in emergency medicine/pre-hospital care.

The time interval between receipt of the message and loading the patient to the ambulance was >15 minutes on 19% (n=75) of the occasions and from the latter time to commencement of the journey was >15 minutes on 7% (n=27) of the occasions.

The call number of sending facility 0.4% (n=1) and sending time 33.2% (n=83) were poorly documented. The past surgical histories 20.8% (n=52), chronic diseases 48% (n=120), psychological problems 13.2% (n=33) and allergies 9.2% (n=23) were poorly documented. Details of physical examination findings except cardio-vascular system were not documented in >50% of transfer forms. Medications had been documented fairly (>60%) in most of the transfer forms and however, the procedures (IV fluids, ECG) were poorly documented (<30%).

Conclusion: The completeness of information in the transfer form was not up to standards. This emphasizes for need of well-structured standard transfer form in the country.

Introduction

The Institute of Medicine defines health care quality as ‘the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge’ [1]. The structure, process, and outcome are assessed to measure the quality of care in any setting and this implies to ambulance care too. This encompasses infrastructure for pre-hospital care and emergency medicine including human resources for ambulance care and management of patients during transportation including proper handover of the patients to the destination institution.

How to cite this article: Nandasena G, Abeysena C. Some aspects of quality of ambulance care and completeness of information in the transfer forms of emergency patients who arrived in ambulances at the National Hospital of Sri Lanka. Int J Clin Anesth Res. 2018; 2: 031-037. https://dx.doi.org/10.29328/journal.ijcar.1001009
Response time in ambulances generally refers to the time taken for an ambulance to respond for a call. One study reported that more distance to the hospital was associated with an increased risk of mortality [2]. Time for an action is an important determinant of quality in pre-hospital care. That is why in emergency medical training, emergency medical service (EMS) personnel are convinced in the importance of golden hour rule. The 'golden hour' is the first hour after an injury or event, where appropriate intervention can save the life. Seconds and minutes of delay can cause lifelong disability, morbidity and even mortality of a person who faces for an emergency, causing lifelong suffering of the patient and/or dependents.

Information provides in the patient chart is important, because, at the place of definitive care, the care provider most of the time need the details of treatment already provided. The treatment provided to the patient at the place of definitive care can improve to a greater extent by knowing details of patient, process, and illness properly, that is why transfer form (patient chart) is important. Risks of adverse medical outcomes are much fold when transferring critically ill patients [3]. Poor communication compromise patient care and unnecessarily increase the workload of staff [4]. Good handover of patients is associated with improvements in patient safety, continuity of patient care, and improved decision making [5].

The rules, standards, guidelines, and advancements in technology in ambulance services are aimed to provide good quality of care to the patient, at the scene and during transportation and to minimize pre-hospital morbidity and mortality as well as to improve the overall outcome of the patient preventing disabilities, as much as possible.

No studies published on quality of ambulance care in Sri Lanka. The objective of this study was to describe some aspects of quality of ambulance care and completeness of information in the patient charts (transfer forms) of emergency patients who arrived in ambulances to the National Hospital of Sri Lanka (NHSL).

Methods

A descriptive study was carried out at the NHSL from August to October 2008. All ambulances that arrived during the study period with an emergency patient were selected. The details of the methods have been published elsewhere [6].

An interviewer administered questionnaire was used to assess the background information of major health staff (doctors, nurses and EMT) (n=35), the response time and reasons for delay throughout the transfer process by the ambulance drivers (n=409) and the training of the minor employees (n=675). A checklist was used to assess the availability of necessary information in transfer forms. It was derived from the guidelines of regions hospitals EMS serves [7]. The checklist for patient chart has been filled by the first author. All the wards were visited on the following day and the Bed Head Ticket were traced for the transfer forms.

Data were analyzed using SPSS version 16.0 and frequencies and percentages were calculated. Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya.

Results

During the study period, 409 ambulances were assessed and 250 (61%) transfer forms were able to trace. A majority (64.5%, n=264) of ambulances had arrived at the NHSL from outside of the Colombo District. Only 33 (8%) of ambulances were from the private sector or non-health ministry.

The total number of staff who accompanied the patients was 1119 of the 409 ambulances (Table 1). A majority of the staff accompany the patients in ambulances were minor employees (60.3%, n=675). The major medical staff accompanied only
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Published: November 20, 2018

with 25 (6.1%) ambulances out of 409. On average, there were only 0.09 major medical staff and 1.65 minor employees per ambulance accompanied the emergency patients. Majority of doctors 13 (88%) who accompanied patients in ambulances had experienced for less than one year in their present post and for nurses, 12 (75%) of them had experienced more than one year. Among the minor employees, 540 (80%) had more than two years of service in ambulances. One hundred and ninety six (58.5%) drivers and 164 (24.3%) minor employees had participated for training programmes in emergency medicine and pre-hospital care (Table 1). Majority of the minor staff (84.8%, n=139) had used their knowledge they gained from the training programmes to assist other staff in ambulances in emergencies.

Problems experienced by major medical staff during transportation were, traffic delays in 40% (n=10), non-availability of necessary equipment/drugs/facilities in the ambulance to manage the patient in 28% (n=7), lack of knowledge and skills regarding patient management in 36% (n=9) and deterioration of patients condition during transportation in 36% (n=9). The time interval between receipt of the message and loading the patient to the ambulance was >15 minutes on 18% (n=75) of the occasions and from the latter time to commencement of the journey was >15 minutes on 7% (n=27) of the occasions.

The major reasons for delay were minor employees at NHSL are not helpful in handing over the patient (33%), documentation takes much time at NHSL (21%), long time taken to take patient from ward/scene to ambulance (11.5%), delay in documentation at sending hospital (9.8%), barriers in the road (8.6%), delay in staff coming to the ambulance (7.4%) and had to transport long distance (6.4%) (Table 2).

From the general information that should be available in the transfer form, call number of sending facility (0.4%), sending time (33.2%), and informed details before sending (8.4%), were poorly documented. In 50% of patient charts, the responding unit was not mentioned (Table 3). From the patient information that should be available in the patient chart, telephone number (0.4%), birth date (0.8%), personal physician (0.4%), were poorly documented (Table 3).

The date of the symptoms appear, information on pain and history of previous episodes were poorly documented. The patients with injuries, mechanism of injury, the date and time of occurrence, information on accident and usage of safety equipment were documented poorly. The past surgical details, (76.4%), details about chronic diseases (50%), psychological problems (71%) and allergies (87.6%) were documented rarely. The information on physical examinations was not documented of more than 50% of transfer forms (Table 4).

### Table 1: Distribution of staff and their training of the ambulances accompanied patients.

| Designation          | Number (%) | % of total crew arrived in all ambulances N = 1119 | Number of staff members per ambulance N = 409 | Participation for training programmes |
|----------------------|------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------|
|                      |            |                                               |                                               | Yes Number (%) | No Number (%) |
| Minor employees      | 675 (60.3) | 1.65                                          | 164 (24.3)                                    | 511 (75.7)    |
| Drivers              | 409 (36.6) |                                               | 196 (58.5)                                    | 139 (41.5)    |
| Nurses               | 16 (1.4)   | 1.4                                           | 2 (12.5)                                      | 14 (87.5)     |
| Doctors              | 15 (1.3)   | 1.3                                           | 4 (26.7)                                      | 11 (73.3)     |
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Table 2: Reasons for delays throughout the transfer process according to view of ambulance drivers (n=409).

| Reasons for delays | If delay in message to take patient to the ambulance | If delay in dispatch of ambulance after taking patient to the ambulance | If delay between departure from sending hospital to arrival at NHSL | If delay from arrival at NHSL to hand over the patient to proper place |
|-------------------|---------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------|
|                    | No Ambulance                                      | No Facilities                                                 | Ambulance mechanical problem                                 | Documentation takes much time at NHSL                                 |
|                    | 20                                                | 1                                                             | 1                                                            | 84                                                                  |
|                    | No Facilities                                     | Late message to the driver                                    | Had to transport long distance                                | Relevant unit not informed prior to transfer                        |
|                    | 1                                                 | 4                                                             | 25                                                           | 1                                                                  |
|                    | No Ambulance driver                               | Late message to the driver                                    | Barriers in the road                                           | Relevant unit not prepared to accept the patient                    |
|                    | 2                                                 | 2                                                             | 35                                                           | 3                                                                  |
|                    | Long time taken to take patient from ward/scene to ambulance | Other delay | No support from public and security people | No enough staff to treat patient |
|                    | 47                                                | 12                                                           | 20                                                           | 9                                                                  |
|                    | Resuscitation procedures at scene taken long time | Other reason | Other delay | Other delay |
|                    | 1                                                 | 2                                                             | 47                                                           | 12                                                                |
|                    | Other                                             |                                                               |                                                               |                                                                     |
|                    | 36                                                |                                                               |                                                               |                                                                     |
| No %               | 4.9                                               | 0.2                                                          | 0.2                                                          | 20.6                                                               |

Table 3: Completeness of general and patient information in transfer form N = 250.

| General information | Not mentioned | Mentioned |
|---------------------|---------------|-----------|
|                     | No | %  | No | %  |
| Sending facility    | 250| 100.0 |
| Sending unit        | 241| 96.4 |
| Receiving facility  | 245| 98.0 |
| Responding unit     | 126| 50.4 |
| Call number of sending facility | 1| 0.4 |
| Name/s of sender/responsible person | 209| 83.6 |
| Sending date        | 241| 96.4 |
| Sending time        | 83| 33.2 |
| Reason/s for transfer | 243| 97.2 |
| Signature of sender | 245| 98.0 |
| Patient name        | 250| 100.0 |
| Address             | 231| 92.4 |
| Telephone number    | 249| 99.6 |
| Age                 | 241| 96.4 |
| Birth date          | 239| 95.6 |
| Sex                 | 243| 97.2 |
| Personal physician  | 249| 99.6 |

The information on medications, the differential diagnosis had been documented fairly (>60%) in most of the transfer forms (Table 5). The information on procedures was documented poorly in patient charts, (Oxygen, IV fluids, ECG). The details of the transfer process were not documented properly such as any changes of the condition during transport (96.4%), how the patient transported to the hospital (97.2%), instructions given to the patient (96.4%) and authorization for transfer process (81.2%) (Table 5).

Discussion

The results showed that trained medical staff was not accompanied in the
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Table 4: Completeness of presenting complaint, history of presenting complaint/injury and clinical examination in transfer form N = 250.

| Presenting complaint and History of presenting complaint | Not mentioned | Mentioned | Not applicable |
|----------------------------------------------------------|---------------|-----------|---------------|
| Presenting complain                                      | No  | %     | No  | %     | No  | %     |
| What events led up to request for assistance?            | 38  | 15.2  | 211 | 84.4  | 1   | 0.4   |
| When did symptoms begin?                                | 100 | 40    | 134 | 53.6  | 16  | 6.4   |
| If pain + severity                                      | 58  | 23.2  | 18  | 7.2   | 174 | 69.6  |
| If pain + location                                      | 21  | 8.4   | 56  | 22.4  | 173 | 69.2  |
| If pain + type                                          | 73  | 29.2  | 3   | 1.2   | 174 | 69.6  |
| If pain + radiation                                     | 74  | 29.6  | 5   | 2.0   | 171 | 68.4  |
| Have there been any previous episodes?                  | 145 | 58    | 37  | 14.8  | 68  | 27.2  |
| If pregnant include details of pregnancy                | 4   | 1.6   | 5   | 2.0   | 241 | 94.4  |
| History of present injury                               |     |       |     |       |     |       |
| What events led up to request for assistance?            | 10  | 4.0   | 27  | 10.8  | 213 | 85.2  |
| What is the mechanism of injury?                         | 17  | 6.8   | 18  | 7.2   | 215 | 86.0  |
| When did it occur?                                      | 21  | 8.4   | 15  | 6.0   | 214 | 85.6  |
| Include information on accident                         | 25  | 10    | 10  | 4.0   | 215 | 86.0  |
| Was safety equipment such as seat belts used?            | 18  | 7.2   | -   | -     | 232 | 92.8  |
| Past medical details                                    |     |       |     |       |     |       |
| List pertinent history                                   | 99  | 39.6  | 145 | 58.6  | 6   | 2.4   |
| Chronic diseases presence or absent                      | 124 | 49.6  | 120 | 48    | 6   | 2.4   |
| Past surgeries presence or absent                        | 191 | 76.4  | 52  | 20.8  | 7   | 2.8   |
| Psychological problems presence or absent                | 177 | 70.8  | 33  | 13.2  | 40  | 16    |
| Allergies                                               | 219 | 87.6  | 23  | 9.2   | 8   | 3.2   |
| All current medications if                              | 90  | 36    | 157 | 62.8  | 3   | 1.2   |
| Physical examination                                    |     |       |     |       |     |       |
| How the patient was first seen / found?                  | 130 | 52    | 115 | 46    | 5   | 2     |
| What was the initial level of consciousness?             | 136 | 54.4  | 61  | 24.4  | 53  | 21.2  |
| Was patient oriented to person, place, and time?        | 173 | 69.2  | 51  | 20.4  | 26  | 10.4  |
| General examination                                      | 136 | 54.4  | 114 | 45.6  | -   | -     |
| Respiratory system examination                           | 124 | 49.6  | 122 | 48.8  | 4   | 1.6   |
| Cardiovascular examination                              | 102 | 40.8  | 146 | 58.4  | 2   | 0.8   |
| Abdominal examination                                   | 199 | 79.6  | 50  | 20    | 1   | 0.4   |
| Central nervous system examination                      | 203 | 81.2  | 46  | 18.4  | 1   | 0.4   |
| If new born one and five min. APGAR score               | 3   | 1.2   | 2   | 0.8   | 245 | 98    |

Table 5: Completeness of details of treatment and transfer process in transfer form N = 250.

| Treatment given                                      | Not mentioned | Mentioned | Not applicable |
|------------------------------------------------------|---------------|-----------|---------------|
| Oxygen liter flow and route                           | No  | %     | No  | %     | No  | %     |
| IV fluids - time                                      | 71  | 28.4  | 2   | 0.8   | 177 | 70.8  |
| IV fluids - type                                      | 68  | 27.2  | 11  | 4.4   | 171 | 68.4  |
| IV fluids - amount                                    | 43  | 17.2  | 36  | 14.4  | 171 | 68.4  |
| IV fluids - drip rate                                 | 71  | 28.4  | 8   | 3.2   | 171 | 68.4  |
| IV fluids - amount                                    | 44  | 17.6  | 34  | 13.6  | 172 | 68.8  |
| ECG - rhythm interpretation                           | 70  | 28.0  | 62  | 24.8  | 118 | 47.2  |
| Medication - time                                     | 96  | 38.4  | 152 | 60.8  | 2   | 0.8   |
| Medication - name                                     | 87  | 34.8  | 161 | 64.4  | 2   | 0.8   |
| Medication - dosage                                   | 92  | 36.8  | 155 | 62.0  | 3   | 1.2   |
| Medication - route                                    | 90  | 36.0  | 156 | 62.4  | 4   | 1.6   |
| Advanced air way - type                               | 2   | 0.8   | 3   | 1.2   | 245 | 98    |
| Advanced air way - size                               | 2   | 0.8   | 3   | 1.2   | 245 | 98    |
| Advanced air way - evaluation                         | 2   | 0.8   | 3   | 1.2   | 245 | 98    |
| Defibrillation – time and joules                       | 3   | 1.2   | 2   | 0.8   | 245 | 98    |
| Transport details (just before, during and just after Transport process) |     |       |     |       |     |       |
| How did patient respond to any treatment?             | 195 | 78    | 41  | 16.4  | 14  | 5.6   |
| Were there any changes of condition during transport? | 241 | 96.4  | 3   | 1.2   | 6   | 2.4   |
| How the patient transported to hospital?              | 243 | 97.2  | 2   | 0.8   | 5   | 2     |
| Whether vital signs recorded/not during transport      | 162 | 64.8  | -   | -     | 88  | 35.2  |
| Differential diagnosis                                | 66  | 26.4  | 184 | 73.6  | -   | -     |
| Document/not instructions given to patient            | 241 | 96.4  | 5   | 2     | 4   | 1.6   |
| Signature of patient/relative giving consent          | 115 | 46    | 120 | 48    | 15  | 6     |
| If patient is minor guardians consent/signature        | 5   | 2     | 18  | 7.2   | 227 | 90.8  |
| Who request transfer – name / designation             | 7   | 2.8   | 243 | 97.2  | -   | -     |
| Who had given authorization for transfer process?     | 203 | 81.2  | 47  | 18.8  | -   | -     |
transportation of emergency patients. There were some preventable reasons for the delays in transfers, which need to get action immediately to minimize them and to achieve a better outcome in pre-hospital care.

According to our study, 64.5% of ambulances had arrived at the NHSL from outside of the Colombo District. The time taken to arrive at the NHSL even from within the limit of Colombo District may take more than one hour. One study done in the UK, revealed increase journey distance to a hospital were associated with increased risk of mortality and 10-km increase in straight-line distance was associated with around a 1% absolute increase in mortality [2]. However, another study reported that there was no difference in mortality between all patients presenting early and those with more than one hour delay [8]. We could not assess the response times because there was no proper way of getting exact times.

It is usually recommended to have at least two competent personnel accompanying the patient to be transferred. The accompanying person should be suitably trained, competent and experienced and preferably should have done training in patient transfer and should have sufficient training in advanced cardiac life support, airway management, and critical care [9]. In our study we found that only 6.1% of patients were accompanied by at least one of a major medical staff. Even though they all were not knowledgeable or competent enough to manage emergency patients. According to an Indian study, 3.66% of the patients were accompanied by a paramedic or trained nurse [10]. Another study reported that 78% of medical doctors, 17% of paramedics, 3% of EMTs and 2% of nurses were accompanied with the patient in ambulances [11]. Another study reported that 11.5% of physicians and 68.9% of nurses were accompanied the patients [12].

The information provided in the transfer form also showed wide variations, while most of the information was not documented. In our study cardiovascular examination was documented only in 58% of transfer forms. Another study reported that documentation of pulse rate was 13.1%, blood pressure was 9.8%, and respiratory rate was 9.8% [12]. Since this is the first study in the country to assess the ambulance services there was rarely any literature to compare the study within Sri Lanka.

The most important quality indicator is the outcomes of the patients in ambulance transfers. We could not assess the outcomes of the patients. Any complication has occurred during the transportation of the patient, the crew has to take the ambulance to the closest hospital. A patient was died or had a complication during transport may not arrive to NHSL. The other limitation was that difficulty in finding all transfer forms. Searching for BHTs at medical record office was also very difficult because some wards they had not sent the BHTs to the record office for more than three months. The private sector ambulances had no structured patient transfer forms to record the details of the patient, only they provided a referral letter which is the other reason for the missing data.

The completeness of information in the transfer forms was not up to the standards, some important details were also lacking, most probably due to lack of well-structured standard transfer form in the country. It is high time to consider implementing an electronic handover system which is a viable, sustainable and safe solution to the handover of patient care [4,13], that improves quality of ambulance care and patient safety.

Acknowledgement

We would like to thank the research assistants and ambulance staff for their support.

Author contribution

Conceptualization, GN, and CA.; Methodology, GN, and CA.; Analysis, GN, and CA.; Investigation, GN.; Writing – Original Draft, CA.; Supervision, CA.
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