Original Article

An evaluation of compliance and performance following the introduction of the Inter-Facility Transport Triage Guideline

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BACKGROUND: In Hong Kong, the reorganization of healthcare frame work for better utilization of resources has led to an increase in the frequency of inter-facility transport in recent years. An Inter-Facility Transport Triage Guideline (IFTTG) was introduced and evaluated on its compliance and performance. This study aimed to evaluate the compliance to the IFTTG and performance of inter-facility transport after the IFTTG was implemented.

METHODS: The patients who required emergency IFT with accompanying personnel in two consecutive periods (pre-implementation period: January 1, 2006 to April 30, 2006; post-implementation period: May 1, 2006 to August 31, 2006) were included. The compliance to pre-transport triage and transport team configuration was evaluated by a review panel with eight performance indicators identified. The performance indicators were compared individually and as an overall score.

RESULTS: Sixty-eight (26 in the pre-implementation period and 42 in the post-implementation period) IFTs were reviewed. There was demonstrable improvement on compliance to the IFTTG. The appropriateness of pre-transport triage increased from 34.6% to 54.8% whereas appropriateness of transport team configuration rose significantly from 73.1% to 92.9% ($P<0.05$). Staff performance on individual IFT performance indicator was satisfactory in both periods and the means of overall score on performance indicators were 7.12 and 7.29 respectively. The most improved performance indicator was the appropriateness of transport team configuration.

CONCLUSIONS: The compliance and performance with the newly implemented IFTTG were satisfactory. However, staff comment and satisfaction with the use of the new guideline should be collected so as to achieve continuous quality improvement.

KEY WORDS: Transportation of patients; Emergency medical services; Practice guideline; Evaluation studies

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INTRODUCTION

In Hong Kong, the reorganization of healthcare frame work for better utilization of resources has led to an increase in the frequency of inter-facility transport in recent years. The indications of transport include the availability of suitable facilities, equipment, staffing or expertise to manage the patient's condition.^[1,2] On the other hand, bed vacancies problem (e.g. lack of

critical care beds) is also a possible reason for inter-facility transport. The risk to transport patients between different facilities is certain. Limitations and difficulties are expected to encounter when caring patient inside an ambulance with confined space and limited medical support.^[3-6] Referring facility and medical transport team bear the primary responsibility to minimize the morbidity and mortality of patient transport.

Alice Ho Miu Ling Nethersole Hospital (AHNH) is a regional hospital in the New Territories East (NTE) cluster of Hong Kong Hospital Authority. In this cluster, clinical services are distributed among different centers of excellence. Surgical services and emergency operations are concentrated in North District Hospital and Prince of Wales Hospital of the same cluster. There are approximately five thousands inter-facility transports in AHNH Emergency Department (ED) annually. The medical transport services are implemented in line with the service reorganization in the NTE cluster to provide safe medical transport for patients to designated medical facilities within the cluster. In view of the growing need of inter-facility transport, the Inter-Facility Transport Triage Guideline (IFTTG) was developed in spring 2006 in AHNH ED to ensure high quality transport services.

METHODS

In spring 2006, the inter-facility and critical care transport (ICCTM) team of AHNH developed the Inter-Facility Transport Triage Guideline (IFTTG) aiming to promote high quality transport services. Moreover, the *Inter-facility Patient Transfer Core Manual* was published in the same year. Before launching the IFTTG in May 2007, we provided training sessions to our staff with hard copies of the IFTTG and *Inter-facility Patient Transport Core Manual*. In the 20-minute training session, the staff members were guided through the use of the IFTTG and the core manual by specialists in emergency medicine. Since good documentation is of paramount importance in ensuring high quality transport, the use of Inter-facility Transport Form was also introduced during the training session.

The Inter-Facility Transport Form consists of five parts. The first part includes demographic data and the reasons for inter-facility transport. The second part includes communication between referring and receiving facilities so as to ensure adequate and appropriate information exchange between the two facilities. The third part consists of a head-to-toe checklist for patient preparation, a checklist of inter-facility transport equipment, and a staff preparation checklist. The last part is the management plan designed to be written by the doctor-in-charge and area for the nursing staff to record the progress and/or adverse events, as well as the vital signs during transport and to report any adverse events. By completing the form, our staff can prepare and carry out inter-facility transport in the most effective way.

On the first of May 2006, the IFTTG was launched.

A retrospective study was carried out to evaluate the compliance and performance to the guideline, so that further improvement could be made. All patients who required emergency inter-facility transport with accompanying personnel were included. The study period was divided into a pre-implementation period (January 1, 2006 to April 30, 2006) and a post-implementation period (May 1, 2006 to August 31, 2006) respectively. Demographic data (Table 1) were collected in the two periods, four months each. Furthermore, we also evaluated the compliance and performance to the IFTTG.

In the evaluation of compliance, two entities were considered: 1) compliance to pre-transport triage and 2) choice of transport team configuration. The patients who required inter-facility transport by accompanying personnel were triaged into four categories: critical, serious, stable and satisfactory according to the IFTTG by the on-duty doctor. In the IFTTG, the "critical" category included patients suffering from immediate life-threatening conditions with unstable vital signs or a potential risk of rapid deterioration. Close intensive monitoring and acute medical intervention were required. Patients suffering from potentially life-threatening conditions with borderline vital signs and a potential risk of rapid deterioration were triaged into the "serious" category, and close continuous monitoring was required with a potential need for acute medical intervention. The "stable" category included patients suffering from a clinical condition with relatively stable vital signs and a small potential risk of deterioration. Close monitoring may be required with a potential need for acute medical intervention. Patients suffering from a clinical condition with stable vital signs and no potential

Table 1. Characteristics of medical transport team

Variables	Pre-implementation period(%)	Post-implementation period(%)	<i>P</i>
Number of patients	26	42	
Age (mean)	35.31	53.83	0.869
Gender			
Female	12/26 (46.1)	18/42 (42.9)	0.790
Male	14/26 (53.9)	24/42 (57.1)	
Transport team configuration			
Nurse-led team	22/26 (84.6)	35/42 (83.3)	0.889
Doctor-led team	4/26 (15.4)	7/42 (16.7)	
Specialty			
Medicine	3/26 (11.5)	4/42 (9.5)	0.068
Obstetrics and gynecology	4/26 (15.4)	10/42 (23.8)	
Surgery	6/26 (23.1)	9/42 (21.4)	
Neurosurgery	5/26 (19.2)	15/42 (35.7)	
Pediatrics	5/26 (19.2)	0/42 (0)	
Orthopedics	3/26 (11.5)	4/42 (9.5)	

risk of deterioration were triaged into the "satisfactory" category. Close continuous monitoring and acute medical intervention were usually not required. In addition, the on-duty doctor decided on the inter-facility transport team configuration, which may be: 1) a doctor-led team, 2) a nurse-led team or 3) a paramedic-led team. Then, the compliance to pre-transport triage and choice of transport team configuration was evaluated retrospectively by comparing the on-duty doctors' decision with a review panel, which was run by two emergency medicine specialists independently.

To evaluate the performance of the IFTTG, performance indicators were used. Eight performance indicators which were considered of utmost importance in ensuring the qualities of inter-facility transport were identified.^[1,2,7-10] They were: 1) pre-transport communication, 2) pre-transport triage, 3) transport team configuration, 4) equipment adequacy, 5) mode and frequency of monitoring, 6) preparation of appropriate pharmacological agents, 7) documentation, and 8) handover phase. These eight performance indicators were compared both individually and as an overall score. SPSS 10.0 software (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The level of significance was set at $P < 0.05$.

RESULTS

In the 8-month study period, 26 patients were included in the pre-implementation period and 42 patients included in the post-implementation period. The majority of patients were transported by the nurse-led team, 84.6% ($n=22$) and 83.3% ($n=35$) in the pre-implementation and the post-implementation period respectively. In the pre-implementation period, 7.7% ($n=2$) of the transported patients were triaged into critical category compared with 11.9% ($n=5$) of critical patients transported in the post-implementation period. On the whole, the inter-facility transport served 29.4% ($n=20$) of neurosurgical patients, followed by 22.1% ($n=15$) of surgical patients, and 20.6% ($n=14$) of obstetric and gynecological patients. However, no significant differences in the mean age, gender, overall transport team configuration and specialties were observed between the two periods (Table 1). Considering the compliance to the IFTTG, the appropriateness of transport team configuration (Table 1) increased significantly from 73.1% to 92.9% ($P < 0.05$). The appropriateness of pre-transport triage (Table 2) increased from 34.6% to 54.8% although it was not

Figure 1. Overall performance score

Table 2. Appropriateness of pre-transport triage and transport team configuration

Variables	Pre-implementation period (%)	Post-implementation period (%)	P value
Appropriateness of pre-transport triage	9/26 (34.6)	23/42 (54.8)	0.106
Appropriateness of transport team configuration	19/26 (73.1)	39/42 (92.9)	0.025

statistically significant. When examining the staff performance on the eight-performance score individually, the results were satisfactory in both periods especially in the performance of pre-transport communication, mode and frequency of monitoring, preparation of appropriate pharmacological agents and proper handover. The overall performance score laid on the high side in both periods (Figure 1). The mean overall performance score was encouraging in the two periods, reaching 7.12 in the pre-implementation period and 7.29 in the post-implementation period respectively.

DISCUSSION

The development, dissemination and implementation of a guideline should be monitored and evaluated in order to maximize its benefits. It is salient to dispatch the appropriate transport team as the personnel involved will be unavailable for other duties for hours, which may jeopardize the safety of the patients staying in the emergency department. On the other hand, personnel involved in the inter-facility medical transport must have the expertise to recognize or anticipate physiological changes that may occur in patients either expectedly or unexpectedly.^[4]

In this retrospective study, the compliance and performance with the newly implemented IFTTG were

evaluated. The results were satisfactory especially in the choice of appropriate transport team configuration. The team staff were able to match the needs of patients and to assign appropriate transport team configuration with the help of the guideline. In the future, it will be helpful to develop a reliable risk scores to assist the assignment of human and technical resources for inter-facility transports without compromising patient care.^[11,12] On the other hand, the reduction in inappropriate team configuration may also generate positive effect on cost and efficiency in inter-facility transports. Therefore, the IFTTG can function as an objective tool for allocation of resources. To further understand the impact of the new guideline, cost analysis studies can be done in the future.

The performance in both pre-implementation period and post-implementation period is encouraging. This may be accounted by the success of "Inter-Facility And Critical Care Transport Medicine (ICCTM)" course provided to our medical transport team members. The majority of our staff are experienced in inter-facility transport, which also explains the outstanding performance in the pre-implementation period. However, the differences in performances between the two periods would be more pronounced in staff less experienced in medical transport.^[13] This also stressed the importance of experienced and well trained transport team to manage patients during medical transport.

Neurosurgical and obstetric-gynecological patients are the main users of the transport services. Guidelines could be revised and refined to meet the special needs of these patient groups. On the contrary, our experience in transporting pediatric patients is relatively limited and more specialized skills are required to transport them to reduce morbidity and mortality.^[14,15] Further training of current transport team members or involvement of pediatric specialists in transporting pediatric patients should be considered.

There are several limitations in the study. Sample size was not calculated prior to the study because of the lack of similar study in the literature. In addition, it was carried out in a center with relatively frequent inter-facility transport because of limited specialty backup. Applying the new guideline and the results of the study may not be feasible in other centers, especially in a tertiary facility with limited inter-facility transport services annually. However, the general principles of inter-facility transport hold true for all in inter-facility transports. On the other hand, paramedics lead the majority of the inter-facility transport. The compliance to pre-transport triage and choice of transport team

configuration in these transports has not been evaluated yet. However, this study acts as a pilot to investigate the success of the guideline and its compliance. Furthermore, to evaluate the effect and success of the guideline, the collection of the outcome of transported patients, including mortality and morbidity, would be helpful.

The compliance and performance to the newly introduced IFTTG are promising, but there are still plenty of rooms for improvement in this brand new guideline. The quality and practicability of the guideline should be reviewed regularly regarding the staff comment and satisfaction. Moreover, quality assurance should be maintained through clinical auditing and performance the monitoring. Regular update course or drill offered to staff will further guarantee the standard of inter-facility transport. By the above measures, the quality and practicability of the IFTTG and hence the quality of inter-facility transport can surely be enhanced in the future.

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