



## Inter-hospital Critical Care Transport: Implementation of a Novel Policy and Review of the Literature

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### Abstract

**Purpose:** To describe a novel inter-hospital transport policy for the critically ill. A review of the literature will be included.

**Methods:** A novel policy pertaining to the transport of critically ill patients from our adult surgical intensive care unit is described. An accompanying literature review was conducted using PubMed and Medline databases for English-language articles pertaining to the transport of critically ill patients, both intra-hospital and inter-hospital from 1986 to 2015. Search terms included critically ill, transport guidelines, intra-hospital transport, and inter-hospital transport.

**Results:** A novel policy was developed at our institution for inter-hospital transport of critically ill patients. The policy involves a multidisciplinary meeting with physicians, critical care nurses, respiratory therapists, transport team members and social workers, prior to transfer. A plan and level of care is determined and a document is generated that is linked to the electronic health record. This policy has been implemented and an IRB approved prospective study is underway to evaluate outcomes based on documented adverse events during transport between facilities. The literature review in this manuscript is based on the limited data that exist primarily describing intra-hospital transports of critically ill patients. The limited articles on inter-hospital transport are reviewed and they mainly focus on transfers between facilities for a higher level of care.

**Conclusions:** A formalized set of guidelines based on a novel institutional policy for the safe transport of critically ill patients between institutions is described. This transport tool involves a detailed pre-transport evaluation by key members of the multi-disciplinary team, which is encompassed in the electronic health record. The literature is replete with guidelines for the safe transport of critically ill patients between hospitals and this novel policy will be studied prospectively regarding minimizing adverse events during critical transport.

### Keywords

Critically ill, Transport policy, Intra-hospital transport, Inter-hospital transport

### Introduction

The decision to transport a critically ill patient is based on the need for diagnostic or therapeutic procedures that are not available within the intensive care unit. Most commonly this type of transport is within the home facility and is for procedures such as imaging or for operative intervention. Theoretically, intra-hospital transfers are safer than the transfers to another institution, as transfers outside of the home facility tend to require the coordination of extensive cardio-pulmonary care and monitoring for the critically ill [1-3].

It is known that any transport of critically patients puts them at increased risk of significant morbidity and mortality. Adverse events have been cited at anywhere from 30-70%, and the physiologic changes can be life threatening particularly in ventilator-dependent patients [4-8].

The purpose of this study is to address the transfer of patients who have been stabilized from their acute critical illness and are then transferred back to their home institution's ICU for further rehabilitation and convalescence. We will describe the implementation of a novel policy that addresses the pre-transfer multi-disciplinary planning and assessment of the transfer of adult surgical intensive care patients to another critical care unit at an outside facility. The subsequent review of the literature will focus on the intra- and inter-hospital transport of critically ill patients.

### Methods

A transport policy of adult surgical intensive care unit patients to outside critical care units will be described. The surgical intensive care unit administrative team at our tertiary referral center hospital established this policy. The administrative team comprised the surgical intensive care unit director, the director of surgical intensive care nursing, respiratory therapy, and key members of the critical care transport team. The policy has been implemented and is incorporated into the electronic medical records.

Our review of the literature was based on relevant papers describing guidelines or policies for the transport of critically ill patients. Papers describing intra-hospital and the inter-hospital transport of patients were reviewed. We performed a review of the PubMed and Medline databases, for articles published in all years.

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Search terms included critically ill, transport guidelines, and inter-hospital transport were included. The studies were limited to the English language articles and the bibliographies of all selected articles were examined for other relevant studies. A total of twenty-four articles were identified between 1986 and 2015 and were included in the review. Excluded studies were any data using pediatric subjects and articles published in non-English.

## Results

### Inter-hospital transport policy

After the acute stabilization of the primary illness and when a patient is deemed stable to transfer back to their home institution's ICU, a pre-transfer multidisciplinary planning meeting occurs. The members of this planning team are as follows: The Intensivist, primary surgeon, clinical nurse specialist, bedside nurse, respiratory therapist, flight team coordinator and social worker. The planning addresses the equipment resources, appropriate personnel and level of expertise needed to meet the needs of the patient during transport. A document template is created and placed in the electronic medical record and is signed by all members of the planning team. This document accompanies the patient in transfer in addition to any discharge summaries including radiographic materials. A referral is subsequently made to the Hospital Transfer and Communication Center who then secure the transport provider. The transport document is provided to the receiving facility and is available in the electronic medical records in the facilities that are currently integrated in our statewide system. The receiving facility must provide verbal and written documentation acknowledging their acceptance of the transport parameters and the facilities capability to provide ongoing critical care expertise to the patient.

The ICU administrative committees at our institution have approved this document, and the Institutional Review Board (IRB) has approved the prospective application of this transport tool. The transport records will be studied obtained and reviewed for all patients transported from our adult surgical critical care unit, to outside critical care units. The transport records will be evaluated for any documentation of adverse cardiac, or respiratory events that may have occurred during transport. These data will be compared to historical controls i.e., patients transported without this pre-planning transport policy in place.

### Literature review and discussion

As care is becoming more regionalized, patients are being treated at tertiary and quaternary centers and can then be transferred back to their home institution to convalesce once they are through the acute phase of their illness [9-11]. These transports are different from those within the hospital for imaging or procedures as previously mentioned. These transports are elective, they involve handoffs and these handoffs are a well-recognized source of error and communication breakdown. It is with these chronically critically ill patients who are at significant risk for potential adverse events to occur during transport [12-14]. Morbidity and mortality associated with these transfers can be reduced with guidelines in place to focus on the equipment resources, personnel and mode of transport required to meet the needs of the patient [15,16].

The majority of published literature is on the intra-hospital transport of patients and the limited papers focusing on inter-hospital transport focus specifically on patients being transferred for higher level of care [1,17,18]. As described by Venkategowda et al. the transport of critically ill patients result in a number of unexpected events which include mechanical mishaps such as oxygen probe or ECG lead displacement occurring 64%; where as major events including drop in  $spO_2$ , variation in blood pressure or arrhythmias occurred 35% [16]. Many of these studies also discuss the federal and state laws that exist in the United States regarding inter-hospital patient transfers including The Emergency Medical Treatment and Active Labor Act (EMTALA) and COBRA laws which define in detail the legal responsibilities of the transferring and receiving facilities and

practitioners [1,17]. It is noted within these regulations that patient transfers cannot be financially motivated and that patients are being transferred for a higher level of care.

There is very little published in the literature regarding the inter-hospital transport of critically ill patients. The majority of data that exists describes intra-hospital transports including those between ICUs, transports for procedures, imaging or to the operating room. The limited articles on inter-hospital transport focuses on transfers for a higher level of care. There is one set of guidelines published in 1993 by the Society of Critical Care Medicine (SCCM) that addresses the issue, but there have not been any recent policies that are standard across all institutions [17]. The guidelines in the aforementioned study, described by the SCCM/AACCN predominantly focused on the transport of patients from one hospital to another specifically for higher level of care. They did not address critically ill patients who have been hospitalized for a period of time and are ready for transfer back to their home ICU. The guidelines described by SCCM for interfacility patient transfers focuses on services that exceed the available resources of the transferring facility [17,19,20]. They describe trying to stabilize the patient prior to transfer but also acknowledge that the patient may not be able to be fully stabilized until they have reached the receiving hospital [5,21]. Brunsveld-Reinder et al. developed a checklist for intra hospital transport safety. Their checklist focused on the pre-transport phase, as this seems to be the critical area for preventing adverse events [8]. The key aspects of the transfer algorithm are similar to our policy in that the appropriate personnel and technological resources are determined and acquired, mode of transportation is determined and communication with the receiving facility is carried out. The main difference that we describe is that the patients requiring transfer are already in a chronically stable state though they may require ongoing ventilatory support and tracheostomy care.

Beckmann et al. identified 176 reports of 191 incidents relating to intra-hospital transfer from 7525 incident reports submitted to the Australian Incident Monitoring Study in Intensive Care collected between 1993 and 1999 [7]. Serious adverse outcomes were identified in 31% of incidents. The major physiological derangements described included hypoxia/hypoventilation, hypotension and cardiac arrest. In a study by Choi HK et al. they noted an unexpected event during transport to occur 36.8% of the time before the institution of a safety checklist [22]. These known adverse outcomes are daunting, particularly as we are witnessing a growing aging population with multiple co-morbid conditions. Droogh and colleagues described a mobile ICU transport program that included simulator-based crew training for ICU nurses and intensivists who constitute the mobile ICU crew. They proposed that implementing simulator-based training will help prepare the transport team to better anticipate possible problems encountered during transport [23]. The implementation of procedures that focus on patient safety seems vital, particularly as medical systems become more integrated and transfers between facilities such as tertiary referral centers and primary facilities are becoming more common. In a recent review by Droogh et al. as regional specialization of medical care is growing, the need to transfer critical patients between facilities is also increasing. Thus knowledge regarding patient needs, physiologic changes that can and do occur during transport leads to the need for standardized guidelines to be in place when planning these sensitive transfers [24]. It is our goal to implement and ensure the safe transport of our most vulnerable patients, and our plan is to prospectively study this tool and to implement changes as needed.

## Conclusion

Limited data exist that document the risks of interhospital transport and there are not well-established guidelines or policies for the transport of critically ill patients from one institutions ICU to another. An easily accessible institution wide policy provides ready guidance for intensivists. We have developed a policy using a multidisciplinary team approach to assure the safe transport of these

critically ill patients at risk for adverse events. This policy can be easily adopted and generalized across all ICUs.

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