EDITORIAL

Intrahospital Transport of Critically Ill Patients: Safety First

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Hospitalized patients often require intrahospital transportation (IHT) for various diagnostic, therapeutic, and even logistical reasons. Complications may occur during transportation, especially if adequate precautions are not taken. Critically ill patients are particularly vulnerable and prone to developing adverse events (AEs) during transportation.[1] These AEs may be attributed to various factors including unstable hemodynamics, ongoing invasive advanced monitoring or organ support, presence of multiple devices or catheters, and even miscommunication between healthcare workers (HCWs).[1–3] Some of the patient factors, like high severity of illness, high body weight, and need for invasive mechanical ventilation with high positive end-expiratory pressure (PEEP), are unalterable. However, certain other factors, especially those associated with human error and equipment-related events, may be easily avoidable.[2–5] Hence, it is prudent to have a better understanding of the reasons and risk factors associated with the development of such complications so that the necessary corrective measures may be instituted. However, there is a dearth of literature from the Indian subcontinent about challenges during the transfer of critically ill patients.

A recent meta-analysis analyzing data from 1898 patients involved in 12,313 IHTs from 24 studies reported an AE rate of 26.2% (95% confidence interval: 15.0–39.2). However, most of these were minor incidents, and the reported frequency of death due to IHT and life-threatening AEs was 0 and 1.47%, respectively.[6] The AEs during transportation may be broadly categorized as derangement of physiological parameters (e.g., desaturation, hypo or hypertension, arrhythmias, agitation, fall in consciousness) and equipment-related (e.g., line or lead disconnections, depleted oxygen supply, dislodgement of tubes or catheters, disconnection to drug infusions, power failure of monitor or infusion pumps). There is a wide variation in the reported incidence of AEs associated with IHT in critically ill patients (17.1–79.9%).[2–5,7] This wide variation in different studies could be because of differences in patient populations, transport protocols, composition of transport teams, and varied definitions used for the reported AEs.

The I-TOUCH study, published in this issue of the Indian Journal of Critical Care Medicine, is the first multi-center Indian study conducted to determine the incidence of AEs related to IHT and evaluate their effect on patient outcomes. This study reported the incidence of AEs as 9.6% in 1065 IHTs and the severity of illness as assessed by APACHE II score, emergent transport, and team composition as independent risk factors associated with the development of AEs.[8] This study highlights the need to recognize the risk factors associated with complications during IHT and may help in formulating policies and protocols, specific to Indian healthcare systems.

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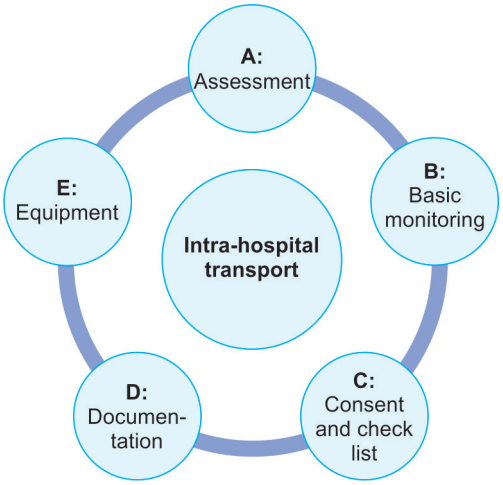

Fig. 1: A structured ABCDE approach for intra-hospital transfer of critically ill patients

Even though several international guidelines exist regarding the transport of critically ill patients, adherence to these guidelines remains poor.[9–12] Similar to many other acute conditions, a simple and structured ABCDE approach may be applied during the IHT of critically ill patients to enhance patient safety (Fig. 1).

A comprehensive assessment should include the patients' physiological parameters, the risk for transport, and the need and urgency for undertaking the transport. The risk-to-benefit ratio should always be determined by the physician in-charge before initiating the IHT. Emergency transports are associated with increased risk of AEs and need a review for the risk-benefit, and preparation.[8] Airway should be carefully assessed, and if

compromised, should be secured before transport. Intubated patients can be adequately sedated and paralyzed, if required. The use of a simplified scoring system based on five clinical patient parameters (respiration, pulse, oxygen saturation, systolic pressure, and consciousness) has also been tried to help in risk assessment.[13] Although this score may help in the quick assessment and accurately identifying patient's transport risk, it requires external validation in larger trials. If the patient is unstable, it is prudent to stabilize the patient with meticulous resuscitation before transport. Intravenous access should be secured and its patency ensured before transportation. Preferably, two peripheral lines or one central venous access should be present.[11] Hypovolemic patients do not tolerate transport well. Hence, hypovolemia should be corrected and any source of active bleeding should be identified and controlled before transport.

Every effort should be made to ensure that the level of monitoring is not compromised during the transport. Preferably, patients should continue receiving the same level of monitoring during IHT as they were during their intensive care unit (ICU) stay. The monitoring must be maintained continuously throughout the IHT. Electrocardiographic monitoring, monitoring of pulse rate, and pulse oximetry should be continuous in all patients along with at least intermittent monitoring of blood pressure and respiratory rate. Additionally, in selected patients, it may be advisable to have continuous intra-arterial blood pressure monitoring and capnography.[10] All monitors, including the syringe pumps and ventilator display, should be clearly visible to the transport staff, at all times.

Informed consent from the relatives must be undertaken explaining to them the need for IHT and the risks involved. The use of a checklist prior to transport has been shown to significantly reduce transport-related incidents, especially equipment-related ones.[14] Hence, a checklist may be designed as per the local feasibility and may be used for IHT. Using a checklist may also increase compliance with international transportation safety guidelines.[15] It is further recommended that standardized written protocols may help improve patient safety and reduce the AEs.[10] These protocols may be based on international guidelines but must consider local risk factors and requirements and be regularly revised using a standard quality improvement process.

Proper documentation of the need, transport procedure, accompanying personnel, and any observations or AEs during the IHT must be done. It may help find any lacunae, further improving the protocols and training of HCWs involved in transportation. It may also be helpful for administrative and medico-legal purposes. Documentation should also include a written handover, including a detailed patient history, current problems, recent investigations, and ongoing medications, to ensure continuity of care.[10]

Equipment-related AEs are common while transporting patients, with a reported incidence ranging from 10.4 to 44%.[4,16] Ensuring the proper functioning of the equipment may help in reducing equipment-related AEs. As a minimum requirement, a blood pressure monitor, pulse oximeter, bag-mask for ventilation, oxygen cylinder, and cardiac monitor/defibrillator must accompany every critically ill patient during IHT. All the resuscitative drugs, including vasopressors and antiarrhythmic agents, should be available along with an adequate supply of intravenous fluids and infusion pumps.[10] Prior to transport, the status of oxygen cylinders and all battery-operated equipment should be checked. All the lines, drains, and catheters should be carefully secured and all equipment should be securely stowed during transportation. Ventilated patients should preferably be transported on portable mechanical ventilators to ensure reliable delivery of the desired oxygen concentration and minute ventilation. Use of manual ventilation is generally employed during IHT. However, it should be avoided as it may lead to hyperventilation or hypoventilation, causing acid-base imbalance, which may precipitate hypoxemia, hypotension, and arrhythmias.

Further, the use of a specialized and trained team of doctors and nurses for IHT may help improve patient safety and reduce AEs. A trained team may be better equipped to reduce AEs, anticipate complications, and manage any problem that may arise during transport. It is recommended that at least two HCWs should accompany critically ill patients and their roles should be clearly defined.[9] The physicians involved in IHT must be trained to manage the airway and deal with any life-threatening situation, including cardio-respiratory arrest. In addition to knowledge and skills, good communication and teamwork are important factors for ensuring patient safety. Even the experience of the accompanying physician is related to the frequency of AEs during IHT. Hence, a specialized and trained team may be instrumental in reducing transport-related AEs.[17]

Intrahospital transportation forms an important component of the care of ICU patients. However, as with any other procedure, it may also be associated with untoward events. Even though life-threatening complications may be rare, these AEs may lead to an increase in morbidity and increased length of stay in ICU or hospital. The incidence of these AEs may be minimized by careful planning, forming a specialized team, training the healthcare workers involved in IHT, and following a structured and protocolized method of transporting critically ill patients.

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