

Intrahospital transport of critically ill patients

Transport is critical too

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It could happen to you too

Event 1

INTERRUPTION OF OXYGEN SUPPLY DURING INTRAHOSPITAL TRANSPORT RESULTING IN CARDIAC ARREST

A patient in his fifties was admitted to the intensive care unit (ICU) following a motorcycle accident causing an unstable fracture of the lumbar spine. He was intubated, ventilated, sedated and fitted with a temperature-sensing bladder catheter. The patient was transported to the imaging department for preoperative magnetic resonance imaging (MRI) of the lumbar spine. He was on a transport ventilator supplied by an oxygen cylinder. When putting the patient into position in the MRI room, he was observed to be cyanotic. Cardiac arrest occurred and was quickly reversed. Post-anoxic encephalopathy subsequently developed.

What happened? Immediate cause

During transport, the oxygen cylinder supplying the ventilator ran out.

Why did it happen? Root causes, absent or deficient barriers

- A new brand of oxygen cylinders had recently been introduced in the intensive care unit, but:
 - staff had not all been trained in their use;
 - doctors found that it was more difficult to read the remaining oxygen capacity in the cylinders.
- When the patient left the ICU, the oxygen cylinder was two-thirds full. However the fraction of inspired oxygen (FiO₂) during transport was high (80%), leading to high oxygen consumption.
- On arrival in the MRI preparation room, with the transport ventilator still connected to the oxygen cylinder, a significant amount of time was taken up while staff:
 - checked the compatibility of the temperature-sensing bladder catheter and, ultimately, removed it;
 - changed the multiparametric transport monitoring system from ICU equipment to the non-magnetic equipment used in the MRI department.
- There was no oxygen tube long enough to connect the transport ventilator to a wall oxygen outlet.
- When the oxygen supply ran out, the measured FiO₂ displayed on the ventilator fell from 80% to 21% but none of the visual or audio alarms were noticed.
- There was no procedure for transporting patients to the MRI department (checklist prior to leaving the ICU, compatibility of equipment, long oxygen tube for connection to a wall outlet).

VENTILATION CIRCUIT ASSEMBLY ERROR DURING INTRAHOSPITAL TRANSPORT RESULTING IN CARDIAC ARREST

A patient in his sixties was admitted to the intensive care unit following a series of strokes. He was on mechanical ventilation. Following difficulty waking the patient up, he was transported to the imaging department for a brain MRI to investigate for further strokes. During the MRI, the patient went into cardiac arrest, reversed following resuscitation manoeuvres.

What happened? Immediate cause

The manual ventilation circuit was incorrectly installed.

Why did it happen? Root causes, absent or deficient barriers

- Manual ventilation was used during the investigation because there was no MRI-compatible ventilator available.
- The ventilation circuit assembly diagram was neither known nor accessible (no computerised document or paper version displayed in the equipment store).
- There was no MRI ventilation circuit ready for use at all times in the equipment store.
- The circuit had been assembled by a healthcare assistant from the replacement team, assisted by a nurse, and had not been checked by a senior doctor.
- The number of medical and paramedical staff present was low.
- There was no procedure in the intensive care unit for the intrahospital transport of intubated and ventilated patients.
- There had been no recent training of paramedical staff in physiology and ventilation techniques.

CONNECTION TO A SWITCHED OFF VENTILATOR ON ADMISSION OF A VENTILATED PATIENT RESULTING IN FATAL CARDIAC ARREST

An intubated and ventilated patient in his sixties was admitted to the intensive care unit (ICU). The patient was taken for a coronary angiography via mobile medical unit return transport. On his return to the unit, the patient was transferred to the intensive care bed and connected to the ICU ventilator. When the intensive care heart monitor wires were connected, cardiac arrest was observed. The cardiac arrest was reversed following resuscitation manoeuvres, but recurred, resulting in the patient's death.

What happened? Immediate cause

The patient was disconnected from the mobile medical unit transport ventilator and connected to the switched off ICU ventilator.

Why did it happen? Root causes, absent or deficient barriers

- There had been a change in the ICU paramedical team on duty between the time the patient left for his coronary angiogram and his return to the ICU.
- The ICU ventilator had not been left switched on in "balloon test" mode while awaiting the patient's arrival.
- The patient transfer took place in the patient's room instead of in the transfer airlock, and the division of tasks between the mobile medical unit team and the ICU paramedical team had not been prepared in advance.
- The mobile medical unit team disconnected the patient's heart monitor to transfer him from the stretcher to the bed.
- After connecting the patient to the ICU ventilator, the expiratory volume was not checked.
- The room opening checklist was not completed and checking of the ventilator was not tracked.
- There was no procedure for ventilator use in the ICU.

Key words: *critical care – intensive care – intrahospital transport – ventilation*

So it doesn't happen again

Intrahospital transport forms an integral part of patient management in the critical care setting. It is required for patient admission, diagnostic imaging investigations and surgical or interventional medical procedures, and has come to be considered as routine. The risks related to the transport of critically ill patients must not be overlooked since they can be considerable. The risk is all the greater when patients are hooked up to a lot of equipment (catheters, mechanical ventilation, circulatory assistance, drains) and more heavily treated (high FiO_2 , vasopressors, sedation). Continuous monitoring is the rule in critical care settings and must not be interrupted during transport.

The frequency of adverse events during the transport of critically ill patients is highly variable and life-threatening complications are reported in 6.7% to 16.8% of patient transport operations.

The causes of these events are related to equipment or personnel (poor communication, inadequate monitoring, incorrect equipment settings, incorrect positioning of the ventilation circuit or the patient). Departments do not always have an appropriate procedure and resources.

Clinical practice guidelines have been issued by critical care learned societies in France and numerous other countries, particularly with respect to the use of a pulse oximeter for patients at risk of hypoxaemia and of capnography in the event of mechanical ventilation.

- Always assess the need for intrahospital transport and the benefit-risk balance.
- Always ensure the continuity of monitoring initiated in the critical care department.
- Always organise intrahospital transport: trained personnel with access to emergency treatments, procedure, equipment, checklist, emergency call facility.

Focus on patient safety collection

The "Focus on patient safety" collection aims to raise awareness among healthcare professionals as to risk management based on care-related adverse events that they have been confronted with, and which are always associated with a series of dysfunctions. **The HAS does not modify or interpret these care-related adverse events reported by healthcare professionals in national care-related serious adverse event databases and selected in focuses on patient safety.** This focus concerns adverse events during the intrahospital transport of critically ill patients.

Find out more

Haute Autorité de Santé. [Reporting serious care-related serious adverse events](#). Saint-Denis La Plaine: HAS; 2022.

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