Strategies for a safe interhospital transfer with an intubated patient or where readiness for intubation is needed: A critical incidents study

Daniel Almqvist a, David Norberg b, Fanny Larsson c, *, Silje Rysst Gustafsson c

a Department of Surgery, Piteå Hospital, Lasarettsvägen 14, 94150 Piteå, Sweden
b Department of Surgery, Skellefteå lasarett, Lasarettsvägen 29, 93141 Skellefteå, Sweden
c Division of Nursing and Medical Technology, Department of Health, Education and Technology, Luleå University of Technology, 97187 Luleå, Sweden

ARTICLE INFO

Keywords:
Critical incident technique
Intensive care nurse
Interhospital transport
Intubated
Intubation readiness
Nurse anaesthetist
Patient safety
Strategies

ABSTRACT

Introduction: The number of interhospital transports with intubated patients or where intubation readiness is required is increasing in Sweden and globally. Specialist nurses are often responsible for these transports, which involve numerous risks for critically ill patients.

Aim: The aim of this study was to describe nurse anaesthetists’ and intensive care nurses’ strategies for safe interhospital transports with intubated patients or where intubation readiness is required.

Method: A qualitative study was conducted using the critical incident technique. During March and April 2020, 12 semi-structured interviews were conducted with nurse anaesthetists and intensive care nurses. Data were analysed according to the critical incident technique, and a total of 197 critical incidents were identified. The analysis revealed five final strategies for safe interhospital transport.

Results: Participants described the importance of ensuring clear and adequate information transfers between caregivers to obtain vital patient information that enables the nurse in charge to identify risks and problems in advance and create an action plan. Stabilising and optimising the patient’s condition before departure and preparing drugs and equipment were other strategies described by the participants, as well as requesting assistance or support if questions or complications arose during transport.

Conclusion: Transports with intubated patients or where intubation readiness is required are complex and require systematic patient-safety work to ensure that strategies for increasing patient safety and decreasing risks are visible to the nurses in charge, that they are applied, and that they are, indeed, effective.

Implications for clinical practice

- The specialist nurse in charge of the transport is responsible for ensuring that important information is transferred so the transport can be performed safely. To identify risks and potential problems in advance, a structured and standardised checklist should be used to reduce the risk of communication failure and insufficient information transfer between caregivers.
- The specialist nurse in charge must conduct a thorough examination to form an opinion about the patient’s status in order to stabilise and optimise the patient’s condition before departure.
- A checklist designed to ensure safe interhospital transfers should always be used when transporting intubated patients or when intubation readiness is required.
- The risks involved with interhospital transfers of critically ill patients also call for continuous education and regular training to ensure patient safety during transport.

* Corresponding author.
E-mail address: fanny.larsson@ltu.se (F. Larsson).

https://doi.org/10.1016/j.iccn.2022.103330
Received 15 February 2022; Received in revised form 22 September 2022; Accepted 24 September 2022
Available online 8 October 2022
0964-3397/© 2022 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).
Introduction

Interhospital transport takes place when a patient needs to be moved from one hospital to another for further care (Gray et al., 2004). A patient may be moved for a number of reasons. For example, the treating hospital may not have a vacancy in its intensive care unit (ICU) or may be unable to provide the required expertise, diagnostics, or treatment needed (Lyphout et al., 2018). According to Eiding et al. (2022), intensive care transports may be urgent or non-urgent. A non-urgent transport involves a patient in need of specialised treatment or, in other cases, a return transfer from a hospital with a higher level of care offering specialised treatment back to the referring hospital near the patient’s home. Unlike the international context, where a physician often accompanies the patient during the transport (van Lieshout et al., 2016), in Sweden a critical care registered nurse (CCRN) or a certified registered nurse anaesthetist (CRNA) is responsible for the care of the patient during the transport (Karlsson, et al., 2019).

With the centralisation of specialist health care, the possibility of providing specialist care in a smaller hospital is limited, particularly in sparsely populated areas and in larger hospitals with narrower specialities. This centralisation has led to an increase in ambulance transports of critically ill patients, both internationally and nationally (Lyphout et al., 2018; Eiding et al., 2022; Swedish Intensive Care Registry, 2019). In Sweden, centralisation implies that transport distances can be long, and times can amount to several hours, especially in less-populated areas. In sparsely populated areas, geographic and weather challenges such as poor road conditions, snow and ice, and limited accessibility can complicate transports. Transports between ICUs and hospitals involve risks for the patient related to his or her unstable condition, often requiring lifesaving interventions. Risks can also be related to the transport itself or to incomplete information transfers or delayed diagnostic and treatment (Swedish Intensive Care Registry, 2019). Technical problems associated with high-tech equipment used during transport sometimes occur as well (Droogh et al., 2012). Patients transported between hospitals are particularly vulnerable to these risks due to their unstable physiological state, which may present unresolved, evolving, or undetected medical problems. Very young and very old patients are often those requiring transport, and the ambulance setting itself imposes risks due to the limited resources available during transport (Lyphout et al., 2018). Approximately half of the patients transported between hospitals are mechanically ventilated (Eiding et al., 2022).

For specialist nurses, the goal during interhospital transports is to preserve patient safety in an unfamiliar environment. For interhospital transports to be safe, the nurse in charge must have explicit and effective strategies (Dabija et al., 2021). Many specialist nurses experience a great responsibility, as well as loneliness and vulnerability, when caring for patients during interhospital transports. Some may feel they are losing control due to being in an unfamiliar environment, and frustration can arise when teamwork is ineffective (Gustafsson et al., 2010; Karlsson et al., 2020). Feelings of abandonment may arise even though the patient’s condition has been optimised before transport (Dabija et al., 2021). Moreover, the nurse in charge might not have sufficient experience to feel confident about transporting a patient (Gustafsson et al., 2010) and may also have to cope with a lack of information or minimal treatment guidelines (Karlsson et al., 2020). The nurse might also worry about certain kinds of equipment not working properly due to technical problems (Gustafsson et al., 2010). Additionally, the ambulance setting is cramped, and the heavy equipment required for safe transport may be difficult to secure. To be able to perform their work, staff cannot always be securely belted into the space with the patient, and working without a seatbelt and with equipment that may not be secured inside the ambulance can present a danger (Bronson et al., 2019). Finally, specialist nurses can experience significant stress when transporting a patient who could die during the transport, as well as concern that the patient’s family members will not have a chance to say goodbye to him or her before transport begins (Gustafsson et al., 2010).

As noted above, interhospital transports with an intubated patient or where intubation readiness is required can be stressful and difficult for the nurse in charge and constitute a patient-safety risk. To transport these patients safely, it is critically important to examine the strategies used by specialist nurses to establish a safe interhospital transport. The need for clearly defined strategies has been previously reported (Dabija et al., 2021), but greater detail is required. Hence, knowledge about these strategies and how nurses apply them to establish safe interhospital transport represents an important contribution and one that has the potential to improve checklists and routines for such assignments. The aim of this study was to describe nurse anaesthetists’ and intensive care nurses’ strategies for safe interhospital transports with intubated patients or where intubation readiness is required.

Methods

Design

This qualitative study was conducted using the critical incident technique (CIT) in accordance with Flanagan (1954). CIT allows for the in-depth investigation of causes and effects of particular incidents (Cunningham et al., 2020) and, therefore, is a methodology frequently used in health-service research to determine the factors that support or restrict the provision of high-quality care or patient satisfaction with care (Viergever, 2019). The goal of CIT is to gather information about human behaviour in defined situations, and the technique in its original form comprises five steps, namely: (1) General Aims, (2) Plans and Specifications, (3) Collecting the data, (4) Analysing the Data and (5) Interpreting and Reporting (Flanagan, 1954). Incidents may be described as events, actions, or behaviours that have a significant impact on outcomes and are remembered by the persons involved (Schluter et al., 2007). To be considered critical, an incident must occur in a situation where the intent of the action appears evident to the observer and the consequences of the action leave little doubt about its impact. The method entails asking several questions and allowing participants to describe their reactions to critical incidents as well as their thoughts, behaviours, and processes (Flanagan, 1954; Schluter et al., 2007). The approach to the method is flexible and may be altered for specific settings (Schluter et al., 2007). CIT was selected for this study because, compared to other inductive approaches, it has the potential to explore specialist nurses’ strategies for specific incidents (Frilund et al., 2017).

The reporting for this research follows the Consolidated criteria for reporting qualitative research (COREQ) checklist (Tong et al., 2007).

Participants and setting

The selection of study participants was purposeful, and the inclusion criteria were nurse anaesthetists (CRNA) and intensive care nurses (CCRN) with a minimum of three years’ experience as specialist nurses and having had experience with interhospital transports with intubated patients or where intubation readiness was required. Unit managers at intensive care clinics at two different hospitals in Northern Sweden granted permission to conduct the study. During discussions with unit managers, 17 nurses who met the inclusion criteria were identified and invited to participate in the study and 12 of them agreed.

The 12 specialist nurses who participated in this study work in a surgical unit or ICU on a daily basis, some of which have a rotation service towards ambulance transport. When participants are assigned to interhospital transports with an intubated patient or where intubation readiness is required, they leave their regular workplace to travel with the patient in an ambulance. This study was conducted in Northern Sweden, where transport times are typically 2 to 3 hours. In the area where this study was conducted, transports take place with ordinary road ambulances, which usually run with a regular ambulance crew.
Data collection

Data were collected through semi-structured individual interviews conducted between mid-March and early April 2021 by the authors (DA or DN). The interviews were conducted by telephone due to the ongoing Covid-19 pandemic, and the participants chose the time for their interview to minimise inconvenience to them. The duration of the interviews, which were recorded on a mobile phone or Dictaphone and transcribed verbatim, ranged from 11 to 20 minutes. They were conducted using a semi-structured interview guide, and a pilot interview was performed to evaluate the interview guide. It was found to generate relevant answers and, thus, remained unchanged; the pilot interview was included in the data analysis. Examples of questions asked during the interviews are: “Can you please tell me about a situation where you were in charge of an interhospital transportation with an intubated patient or where intubation readiness were needed, and whether there were any complications?”; “What happened in that specific situation?”; “How did you react during that specific situation?”; and “Is there anything you would do differently if a similar situation occurred again?”. The participants were not asked to comment on or review the transcribed interviews. Field notes were taken to aid the interview but were not included in the analysis.

The number of critical incidents, rather than the number of participants, is what determines data saturation in CIT. A critical incident can be described as an act or behaviour, either effective or ineffective, that is decisive for a certain outcome (Flanagan, 1954). Flanagan (1954) recommended that the number of critical incidents should be at least 100. In this study, critical incidents were defined as strategies used by specialist nurses that led to a safe interhospital transfer. A total of 197 critical incidents were identified.

Data analysis

The data analysis was performed following Flanagan’s (1954) method which comprises three steps. The first step involves formulating a frame of reference pertaining to how the data will be used. In this study, the frame of reference was behaviours that promote the safe interhospital transport of an intubated patient or where intubation readiness is required. From the transcribed interviews, critical incidents that matched the frame of reference were jointly identified and extracted by the authors and discussed until consensus was reached. The second step is to shorten, sort, and categorise the incidents (Flanagan, 1954). Incidents were grouped together based on similarity of content, forming subcategories that were again grouped together until the final categories were mutually exclusive. The authors continuously discussed the steps of the categorisation process to ensure investigator triangulation of the data and thus minimise the risk of biases from one researcher. The participants in this study were not asked to provide feedback on the findings in the data analysis. In the third and final step of the data analysis, in accordance with Flanagan (1954), the specificity-generality of the data, that is how the data will be reported, was determined. The findings of this study are presented with a high level of specificity in order to provide a comprehensive picture of the strategies utilised by specialist nurses to develop patient-safe interhospital transports.

Ethical considerations

No ethical review was required in accordance with the Swedish Act (SFS, 2003:460) concerning the Ethical Review of Research Involving Humans since this study did not collect any sensitive personal data. Hence, the project underwent a local ethical review at the Department of Health, Education, and Technology at Luleå University of Technology and was approved before data collection started. The ethical principles in the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978) were followed in all steps of this study. All study participants received an informational letter stating the aim and purpose of the study. The letter clearly stated that participation was voluntary and could be discontinued at any time without explanation. Written consent to participate in the study was collected, and all recorded interview materials were anonymised and immediately transferred from the recording devices to password-protected computers to maintain confidentiality.

Findings

A total of 12 specialist nurses participated in this study. Background data for the participants are presented in Table 1. In all, 197 critical incidents were identified, and the analysis resulted in five final categories with 24 subcategories (Table 2).

Ensuring an optimal information transfer between caregivers

Receiving a sufficient handover was seen as critically important since a large amount of information had to be gathered in a short amount of time. Getting a report on baseline values and knowledge about how the patient responded to previous treatments was necessary for keeping him or her stable during transport. It was also important to ensure that this information transfer between hospitals was completed before departure. The sending department would report to the receiving unit so that there were no ambiguities when the patient arrived and so the receiving staff were ready to take over the care and responsibility for the patient. The participants further pointed out that a significant part of the preparations was to have a good dialogue with the sending anaesthetist and for this person to be present at the handover. This allowed coordination of their planning with the doctor and getting clear directions about how to treat, for instance, low or high blood pressure, as the following comment illustrates:

‘Then I also want a good handover and that vital parameters are filled in on the paper journal. I want the same overview as in the ICU, being able to see how their tidal volume has been, their carbon dioxide, pressure and respirator settings and things like that’. (Participant 5)

Moving the patient between the hospital bed and the ambulance stretcher was an element that required a high level of cooperation between many people. The nurse responsible for the transport would usually be the person most accustomed to the equipment, and participants stated that this person should, therefore, lead the work. Transfer was described as a problem for which staff needed to use different strategies depending on the

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Participants’ characteristics (N = 12).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>5</td>
</tr>
<tr>
<td>Men</td>
<td>7</td>
</tr>
<tr>
<td>%</td>
<td>41.7</td>
</tr>
<tr>
<td>58.3</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>43.2</td>
</tr>
<tr>
<td>SD</td>
<td>8.7</td>
</tr>
<tr>
<td>Min - max</td>
<td>29–55</td>
</tr>
<tr>
<td>Specialisation*</td>
<td></td>
</tr>
<tr>
<td>Nurse anaesthetist</td>
<td>9</td>
</tr>
<tr>
<td>Intensive care</td>
<td>5</td>
</tr>
<tr>
<td>Prehospital care</td>
<td>3</td>
</tr>
<tr>
<td>Years of working experience as specialist nurse</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>14</td>
</tr>
<tr>
<td>SD</td>
<td>6</td>
</tr>
<tr>
<td>Min - max</td>
<td>4–22</td>
</tr>
<tr>
<td>Estimated number of transports completed</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>40</td>
</tr>
<tr>
<td>SD</td>
<td>28</td>
</tr>
<tr>
<td>Min - max</td>
<td>10–100</td>
</tr>
</tbody>
</table>

*Five participants had double specialisation. No participant was specialised in only prehospital care.
A kind of mental limit for when it becomes relevant to intubate: an awake patient was transported with intubation readiness. One participant mentioned that interhospital transports with intubation readiness is not preferred, given the working environment and the participants’ limitations and to ask for assistance.

The participants considered it vitally important to examine the patient before transport in order to form an opinion about his or her condition and how stable or unstable the patient was before the transport began. Target values during transport could also need to be adjusted. The participants described the importance of thinking through any problems that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might occur with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance.

Identifying risks and problems in advance and creating an action plan

The participants considered it vitally important to examine the patient before transport in order to form an opinion about his or her condition and how stable or unstable the patient was before the transport began. Target values during transport could also need to be adjusted. The participants described the importance of thinking through any problems that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance.

Identifying risks and problems in advance

Forming an opinion about the patient’s condition

Being alert to changes in the patient’s condition

Having a plan to manage the airway

Having a plan to treat high/low blood pressure

Finding solutions to unforeseen problems

Stabilising/optimising the patient before transport

Minimising the number of infusions and working in the simplest possible way

Not being in a hurry to get going

Working calmly and systematically

Making sure that certain medicines are prepared and sent from the ICU

Bringing too much rather than too little medicine

Going through and checking the equipment before transport

Feeling confident with the equipment used

Keeping medicines and equipment close at hand

Being able to contact a doctor for advice during transport

Requesting reinforcement/equipment in an oncoming ambulance

Not accepting a transport where there may be problems you cannot handle

Mentally preparing that the patient may not survive the transport

Patient’s size, weight, and conditions. It was described as important to talk to colleagues so that everyone agreed on how to respond if a particular situation arose and to be clear about how the colleagues would then assist. For instance, a plan for managing respiratory problems should be communicated to the ambulance staff in advance so that everyone knew what was going on if the nurse called for help.

Identifying risks and problems in advance and creating an action plan

The participants considered it vitally important to examine the patient before transport in order to form an opinion about his or her condition and how stable or unstable the patient was before the transport began. Target values during transport could also need to be adjusted. The participants described the importance of thinking through any problems that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance.

Identifying risks and problems in advance

Forming an opinion about the patient’s condition

Being alert to changes in the patient’s condition

Having a plan to manage the airway

Having a plan to treat high/low blood pressure

Finding solutions to unforeseen problems

Stabilising/optimising the patient before transport

Minimising the number of infusions and working in the simplest possible way

Not being in a hurry to get going

Working calmly and systematically

Making sure that certain medicines are prepared and sent from the ICU

Bringing too much rather than too little medicine

Going through and checking the equipment before transport

Feeling confident with the equipment used

Keeping medicines and equipment close at hand

Being able to contact a doctor for advice during transport

Requesting reinforcement/equipment in an oncoming ambulance

Not accepting a transport where there may be problems you cannot handle

Mentally preparing that the patient may not survive the transport

Patient’s size, weight, and conditions. It was described as important to talk to colleagues so that everyone agreed on how to respond if a particular situation arose and to be clear about how the colleagues would then assist. For instance, a plan for managing respiratory problems should be communicated to the ambulance staff in advance so that everyone knew what was going on if the nurse called for help.

Identifying risks and problems in advance and creating an action plan

The participants considered it vitally important to examine the patient before transport in order to form an opinion about his or her condition and how stable or unstable the patient was before the transport began. Target values during transport could also need to be adjusted. The participants described the importance of thinking through any problems that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance.

Identifying risks and problems in advance

Forming an opinion about the patient’s condition

Being alert to changes in the patient’s condition

Having a plan to manage the airway

Having a plan to treat high/low blood pressure

Finding solutions to unforeseen problems

Stabilising/optimising the patient before transport

Minimising the number of infusions and working in the simplest possible way

Not being in a hurry to get going

Working calmly and systematically

Making sure that certain medicines are prepared and sent from the ICU

Bringing too much rather than too little medicine

Going through and checking the equipment before transport

Feeling confident with the equipment used

Keeping medicines and equipment close at hand

Being able to contact a doctor for advice during transport

Requesting reinforcement/equipment in an oncoming ambulance

Not accepting a transport where there may be problems you cannot handle

Mentally preparing that the patient may not survive the transport

Patient’s size, weight, and conditions. It was described as important to talk to colleagues so that everyone agreed on how to respond if a particular situation arose and to be clear about how the colleagues would then assist. For instance, a plan for managing respiratory problems should be communicated to the ambulance staff in advance so that everyone knew what was going on if the nurse called for help.

Identifying risks and problems in advance and creating an action plan

The participants considered it vitally important to examine the patient before transport in order to form an opinion about his or her condition and how stable or unstable the patient was before the transport began. Target values during transport could also need to be adjusted. The participants described the importance of thinking through any problems that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance. Some described a clear structure in their way of thinking in order to identify problems and risks that might arise with the patient in advance.
‘You will discover that you are in a bad situation if there are complications along the way. So it is incredibly important to stabilise the patients as much as possible and not to start the transport too fast. Some anaesthesiologists will rush us, saying that this patient has to go to a larger hospital quickly. Yes, absolutely, but the patient must be fairly stable before you go so that nothing happens along the way’. (Participant 8)

The participants also emphasised the importance of reviewing which drugs the patient was receiving in his or her progress from the ICU and determining whether any medications could be discontinued during transport to minimise the number of drug infusions so that the transport could be performed in the simplest possible way. The infusions and access sites should also be easy to see and to reach.

‘You remove the drugs that you do not need during transport so that everything is in order and no infusion tubes are tangled. You want straight and visible access sites’. (Participant 5)

Preparing the drugs and the equipment

Participants explained that it was important to ensure that all equipment that could be needed was close at hand in the ambulance to avoid having to search for or prepare items or medications if an urgent situation occurred. This meant extracting and preparing the medicines that could be needed and storing them so they were easily accessible during transport. The nurses also pointed out the need to make sure that certain medicines were prepared and sent with the patient from the ICU, as illustrated in the following comment:

‘You should start thinking in the ICU before going to the ambulance about where to keep the equipment in the vehicle. Where should I place the respirator? Where should I place the monitoring? Where should I place all the equipment in the transport, and where should it be located so that it is as safe as possible?’ (Participant 7)

The participants described the importance of checking the equipment before transport and emphasised the need to feel confident about all equipment as there is no access to spare equipment or to assistance if something stops working. This meant having sufficient knowledge about how all of the necessary equipment worked, as well as having experience handling it. Setting aside sufficient time to become familiar with the equipment was considered important:

‘Don’t risk anything; use the equipment that you are used to … That is very important!’ (Participant 8)

Several participants explained that it was important to keep in mind that there was always a risk that problems like poor road conditions, a punctured tire, or other problems could occur that would result in the transport taking longer than expected. Therefore, it was essential to bring enough drugs to last longer than the expected transport time. It was considered better to bring too many drugs or too much equipment than to end up in a situation where needed items were not available during travel between hospitals.

Realising one’s limitations and to ask for assistance

Realising one’s limitations started before the transport began by not accepting the assignment if the individual did not feel able to handle the situation. In these cases, the participants stressed the importance of not taking on an assignment they were not able to manage. These assignments were better left to a more-experienced colleague. Having experienced staff and an established routine for interhospital transports increased a sense of calm, which could sometimes lead to the nurse not worrying as much about coping with the situation.

Several participants described the importance of being humble and recognising when they should ask for help. This could involve calling an anaesthetist to discuss a situation and ask for support in decision-making and guidance on how to handle a specific situation, e.g. if the patient developed pulmonary oedema or was in danger of developing circulatory or respiratory failure. It could also involve requesting assistance from an oncoming ambulance, as the following comment indicates:

‘I think the most important thing is that you … are calm and do not do too much and think ‘now I have to intubate’. Usually it works out if you can be a little cool and wait. It’s when you do things too early and think you have to solve everything yourself instead of calling for help that you can end up in dangerous situations.’ (Participant 2)

The importance of keeping in mind that a patient might be too ill to manage being transported was also mentioned. At such times, it was important to know that a patient might not survive even if the nurse had done everything she could.

‘You always have in the back of your mind that you might not arrive. Then you have to be confident that you have your plan for how to handle whatever might happen, and then know that it may not work anyway because that is the risk that exists when you get into an ambulance to transport a critically ill patient.’ (Participant 6)

Discussion

The aim of this study was to describe nurse anaesthetists’ and intensive care nurses’ strategies for safe interhospital transports with intubated patients or where intubation readiness is required. The results revealed five final categories: Ensuring an optimal information transfer between caregivers, identifying risks and problems in advance and creating an action plan, stabilising and optimising the patient before departure, preparing the drugs and the equipment, and realising one’s limitations and to ask for assistance.

Our findings revealed that ensuring the transfer of clear and explicit communication and accurate, up-to-date information between caregivers was an important strategy for safe interhospital transport. This is in line with Dabija et al. (2021) who concluded that an adequate report is one of the preparations needed for nurses to feel safe during interhospital transports. According to Karlsson et al. (2020), nurses might feel compelled to rely on a verbal handover that is often brief and not always satisfactory or complete, especially if they do not know the patient prior to the transfer. The handover is usually done at the same time other preparations are being made for the patient, which can lead to misunderstandings and the risk of essential information being overlooked (Dabija et al., 2021). Eiding et al. (2019) explained that vital patient information is sometimes lost during handovers both pre- and post-transport, perhaps related to a desire by staff to be relieved of responsibility for the patient as soon as possible. Moreover, gaps in information can occur when the staff person who takes over the responsibility for the patient receives too little information or information that is inaccurate, incomplete, untimely, or misinterpreted. Communication failures increase the risk of patient harm (The Joint Commission, 2021). Information can be lost during handover, and to reduce the risk of communication failure, Lyphout et al. (2018) advocated using a structured and standardised patient hand-off tool, as well as setting aside time for the handover. The SBAR (Situation, Background, Assessment, Recommendation) is a structured patient hand-off tool frequently used to ensure clear communication. It has been proven to improve nursing handover communication (de Meester et al., 2013; Müller et al., 2016) and to decrease unexpected deaths (de Meester et al., 2013). In addition, the Intensive Care Society (ICS) has developed guidelines for interhospital transport in the UK and provides information about various complications that can occur during interhospital transport and recommendations on how each of these can be managed (Intensive Care Society, 2019).

The participants in our study emphasised the importance of identifying risks and problems prior to the transport to be able to create an action plan. Being one step ahead and foreseeing potential scenarios in
order to develop the necessary level of readiness for action has been described as important and as a prerequisite for feeling secure both during intrahospital as well as interhospital transports (Bergman et al., 2020; Dabija et al., 2021) and when managing a difficult airway (Dabija et al., 2019). Nurse anaesthetists who have intubated obese patients have emphasised the significance of thorough preparation, risk awareness, and the use of various assessment tools in order to perform a safe intubation (Larsson et al., 2019). According to Martin (2020), it is extremely important for the patient to receive optimal fluid treatment and to be equipped with the monitoring needed for the transport before departure since undertaking major interventions during transport is very difficult. The ideal interhospital transport is one where nothing needs to be adjusted during the journey (Martin, 2020). One of the most significant measures when transporting a patient who is intubated or where intubation readiness is needed is having access to a safe airway. If the intubation fails, the patient can—in the worst case—suffer brain damage or die (Ducharme et al., 2017). This underscores the crucial importance of having a stabilised and optimised patient before the interhospital transport begins in order to minimise exposure to unnecessary risks that can result in permanent injury or death.

Preparing the equipment and drugs used during the interhospital transport was described as important for performing a safe interhospital transport. This implied having an overview of the equipment and knowing how to use it. Knowing and mastering the equipment is a key factor to safe and successful transports (Bergman et al., 2020) and facilitates the care given to the patient during transport (Dabija et al., 2021). Specialist nurses may experience worry and concern about handling unfamiliar equipment or lacking the necessary equipment (Dabija et al., 2021; Gustafsson et al., 2010; Karlsson et al., 2020). Technical errors occur in 15.6 % of interhospital transports, most of which are related to the power supply, the gas supply, or the vehicle (Droogh et al., 2012). Complications are to be expected, largely related to the high-tech equipment used, and can lead to major consequences for the patient in the event of an accident (Lyphout et al., 2018). Treatment guidelines and checklists result in safer interhospital transfer of patients (Martin, 2020); however, it has been reported that treatment guidelines or checklists are often lacking, not fully implemented, or not mandatory (Eiding et al., 2019). Unclear treatment guidelines during the interhospital transport can create worry and concern for the nurses in charge as they need to trust their own competence (Dabija et al., 2021; Gustafsson et al., 2010).

An important strategy for patient-safe transport was being able to realise one’s limitations and having the courage to request assistance. This could mean contacting a doctor, requesting equipment, or asking for more staff in an oncoming ambulance. Realising one’s limitations could also mean not accepting a transport that would exceed one’s capacity. Dabija et al. (2021) reported that intubation is not a part of the CCRN’s job and, therefore, is not fair to either the patient or the nurse. According to Bergman et al. (2020), it is important to have a committed doctor available, either at the start or during the transport, to provide prescriptions, information, and directives on alternative courses of action in emergency situations. Caring for a critically ill patient during an interhospital transport can be experienced as lonely and as being exposed to a high level of risks, thereby creating stress and anxiety for the responsible nurse (Dabija et al., 2021; Gustafsson et al., 2010; Karlsson et al., 2020). According to Karlsson et al. (2020), nurses might feel unprotected when they are not in their familiar ICU environment, and awareness of risks can be perceived as a heavy burden and can contribute to stress. Nurse burnout is a response to unrelieved, long-term workplace stress and has a negative effect on nurses’ health. Nurse burnout is also negatively associated with the safety and quality of patient care (Jun et al., 2021), thus highlighting the importance of working preventively to reduce nurses’ feelings of stress and vulnerability during interhospital transports. Systematic quality work is needed to give nurses clear routines and guidelines to follow when transporting intubated patients, as well as education and training to prepare nurses for these assignments.

Using checklists when transporting critically ill patients has been found to result in better compliance with guidelines (Williams et al., 2020). Even though the need for and importance of structured checklists have been previously highlighted (Dabija et al., 2021; Lyphout et al., 2018) and appear to improve patient safety (Thomassen et al., 2014), there is still a deficit regarding their use in this particular context (Eiding et al., 2019).

The strategies for safe interhospital transports with intubated patients or when intubation readiness is needed have been identified in this study. Together with guidelines that already exist within different settings, such as in the UK (Intensive Care Society, 2019) and the related experiences reported by Dabija et al. (2021), the results of this research can facilitate the development of much-needed contextual protocols and checklists.

**Strengths and limitations**

Critical incident technique is an appropriate method when the aim is to determine what factors support or restrict high-quality care and may help with suggestions for how a certain activity may be improved (Viergever, 2019). However, there is a risk that critical incidents tend to focus on events that are a threat to patient safety instead of allowing a focus on positive outcomes as well (Steven et al., 2020). The data for this study were collected through semi-structured telephone interviews for which questions were formulated to meet the study’s aim. To increase its validity, a pilot interview was conducted to ensure that the questions were aligned with the aim. Due to the Covid-19 pandemic, all interviews were conducted by phone. Telephone interviews are effective as they are perceived to save time for both the researchers and participants. Further, the participants may feel more anonymous in relation to the researcher compared to a face-to-face interview. However, there may be the risk that the interaction between the researcher and the participant is hindered as it is not possible to read the participant’s body language or facial expressions over the telephone (Holloway and Galvin, 2017).

The authors conducting the interviews (DN & DA) both had experience working in an ambulance setting and in emergency departments. Thus, they had a pre-understanding of working with interhospital transports with intubated patients or where intubation readiness is required. In conducting the interviews, they were familiar with several interviewees since they were former colleagues. This pre-understanding at the time of the interviews can be seen as a strength as the authors were familiar with the situations and could ask pertinent follow-up questions, thereby obtaining knowledge that would otherwise have been lost. However, this could also be considered a weakness if the pre-understanding dominated the interpretation of the results (cf. Alveson and Sandberg, 2022). To increase the trustworthiness of the study, data collection and analysis were described in detail and triangulated through discussion in the research group. Quotes from the participants were included to illustrate the interpretation of the data. As the authors translated the quotes from Swedish to English, there is a risk that the essence of a quotation has been changed.

The selection of participants was purposeful. The participants had different genders, ages, work experience, and specialties and were recruited from two different hospitals in two different regions in order to achieve a heterogeneous group of study participants.

**Conclusion**

Specialist nurses use several strategies for safe interhospital transports with intubated patients or where intubation readiness is required. The specialist nurse in charge of the transport is responsible for ensuring that important information is transferred so the transport can be carried out safely and for gathering sufficient information to be able to identify risks and potential problems in advance to create an action plan. The nurse needs to perform a thorough examination to form an opinion
about the patient’s status and to stabilise and optimise the patient before departure. Transports with intubated patients or where intubation readiness is required are complex, and the complexity can sometimes exceed the nurse’s capacity. This requires the ability to realise one’s limitations and to request assistance when needed, as well as systematic patient-safety work to ensure that strategies for increasing patient safety are made visible, are applied, and are effective. At the present time, there is no structured checklist available for this particular context. The strategies identified in this study can be utilised to help determine what should be included in such checklists.

Ethical statement

No ethical review was required in accordance with the Swedish act (2003: 460) on ethical review of research involving humans since this study did not collect any sensitive personal data. However, the project underwent a local ethical review at the Department of Health, Education, and Technology at Luleå University of Technology, and was approved before the data collection started. The ethical principles in the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978) were followed in all steps of this study. The study participants received an information letter stating the aim and purpose of the study. The information letter clearly stated that participation was voluntary and could be discontinued at any time without explanation. Written consent to participate in the study was collected through email because of the ongoing pandemic. All recorded interview material was anonymized and was immediately transferred from the recording devices to password protected computers to maintain confidentiality.

Author contributions

All authors have agreed on the final version and meet at least one of the following criteria recommended by the ICMJE (https://www.icmje.org/recommendations/): Substantial contributions to conception and design, acquisition of data or analysis and interpretation of data; drafting the article or revising it critically for important intellectual content.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

The authors thank all study participants for taking the time to contribute to this study.

Role of the Funder Source

This research received no specific grant from any funding.

Data availability statement

The data from this study is available from the corresponding author upon reasonable request.

References


