A quality improvement study: to assess the impact of a transfer checklist on patient safety for inpatients in Critical Care.

Abstract

Critically ill patients often require transfer to diagnostic scanning departments whilst in Critical Care. Although transferring Critical Care patients to other departments is necessary, it poses risks to patient safety due to the complex level of support required during transfer. Without adequate preparation of essential medication, equipment and monitoring, patient safety could be compromised.

The aim of this quality improvement study was to implement a transfer checklist into practice to assess the effect it has on patient safety, using incident occurrence, compliance, and workforce experiences as outcomes.

Results showed a total reduction in incident occurrence post implementation of a transfer checklist. The compliance rate of the checklist was 69.4% overall. A user survey provided valuable insight into the use of the checklist and incident reporting.

This study has shown that using a transfer checklist in practice has a positive impact in reducing incidents and therefore increases patient safety.

Background

Intensive Care Units (ITU) sometimes referred to as Critical Care Units are areas of nursing that provide care to the most unwell patients in hospitals; frequently requiring diagnostic interventions (NHS Services, 2023, Bourn et al, 2018). There is a regular need for healthcare professionals to diagnose, stabilise and treat patients through the transfer from ITU to diagnostics such as Computerised Tomography (CT) or Magnetic Resonance Imaging (MRI) scans. However, transferring patients from ITU poses risks of deterioration due to the level of support required during transfer, often resulting in a negative change to the haemodynamic status of critically ill patients. Without adequate preparation before departure, patient safety can be severely compromised as transfers that are poorly performed without adequate organisation significantly contribute to the mortality and morbidity of patients within ITU (Kulshrestha and Singh, 2016; Doucet et al, 2017; Bourn et al, 2018; Williams et al, 2020; Bender et al, 2021).

Risk can be described as any event that can or has led to harm to patients (Doucet et al, 2017). These events are reported within the National Health Service (NHS) through an incident reporting system called Datix. The Datix system facilitates staff to report any incidents which could have, or did, lead to harm for patients receiving healthcare and cover a range of topics such as transfer incidents, tissue damage, falls and medication errors. These incident reports are significant, firstly

in highlighting areas of improvement or significant risk based on the prevalence, but in turn can also show a trend in the occurrence of incidents and give insight into the effects of a service improvement implemented to reduce a noted problem (NHS improvement, 2017). Incidents are investigated and categorised into unavoidable or avoidable causes. A substantial percentage of all adverse events relating to transfer result from preventable causes which highlight the need to improve the contributing factors causing the occurrence of such incidents (Thomassen, 2014). The Intensive Care National Audit and Research Centre (ICNARC, 2019) highlighted the potential risk in figures showing that 87.4% of patients admitted to adult ITU units in the United Kingdom (UK) require respiratory ventilator support, whilst 89.2% of patients require cardiovascular organ support with additional percentages displayed for neurological, renal, liver, and gastrointestinal requirements. This level of support indicates the elevated level of potential risks associated with transfer. Although there is a risk of unavoidable patient deterioration on transfer based on this level of support, complications that occur on transfer also relate to equipment failures or absence of, and poor preparation of medication, giving reasonable evidence that risk could be minimised if adequate preparation is prioritised (Droogh et al, 2015). Up to 90% of incidents occurring during the transfer of critically ill patients could be prevented

through better preparation prior to departure from the ITU environment (Doucet et al, 2017).

This study aimed to implement and assess the effectiveness of a transfer checklist to improve patient safety on transfer. Checklists are not only recognised to have a positive effect on safety in healthcare but are also important and utilised in other areas including aviation where safety is paramount (NHS England, 2019). Human factor error contributes to a significant number of preventable mistakes within healthcare and utilising a checklist enables a step-by-step guide in ensuring patient safety is prioritised in procedures or interventions, reducing the risk of essential steps being missed (Sameera et al, 2021). The Intensive Care Society (ICS) details guidelines for the transfer of critically ill patients recommending the use of a checklist on transfer to increase preparation and reduce risk (ICS, 2019). When comparing these guidelines to current practice, it was clear that an Acute Hospital Trust in the Midlands region of the UK did not use a checklist for intra-hospital transfer despite both the (ICS, 2019) and the National Institute for Health and Care Excellence (NICE, 2018) recommending the use of a checklist for transfer. A noted number of incidents had occurred during transfer from ITU; therefore, a transfer checklist was created in accordance with the ICS (2019) guidelines to be implemented within the ITU of the acute hospital.

Methods

An action research method was adopted. This method is often used amongst healthcare professionals as it provides an approach to improve practice. As healthcare is frequently adapting to the needs of the service, further improvements and adjustments would need to be considered in future. The five steps involved in each cycle of the action research were:

- See a problem
- Examine the problem and literature
- Plan action/ take action
- Reflect/ evaluate the effectiveness
- Reassess (Thomas, 2017).

The study was analysed using three phases. Firstly, a retrospective incident report was conducted to display the number of reported incidents relating to transfer from September 2017 to September 2019 within an Acute hospital in the Midlands UK. This timeline was prior to the checklist's implementation period and aimed to establish a baseline of data on the number of incidents occurring during transfer before any intervention was implemented. A second retrospective DATIX search was completed between 1st Oct 2019- 30th Sept 2020. This period was chosen as the checklist was in operation during this time.

The second phase highlighted clinical compliance. The transfer checklist was audited over a four-week period between 3rd August 2020- 31st

August 2020. Although the audit lasted four weeks, patients were audited on a weekly basis providing an overall and weekly rate of compliance. The inclusion criteria for audit included any patient that received either a CT or MRI whilst being on ITU during the four-week period of audit.

The audit data was collected using an audit form as it facilitated a structured approach to auditing using yes or no answers. Each patient that had a scan during this period was audited to assess whether a transfer checklist was used during transfer and this data was then duplicated on an excel spreadsheet using a pivot table which allowed the quantitative data to be displayed as nominal ordinal data using two columns: the number of audits and whether a checklist was used. Following on from this, an overall and weekly compliance rate was calculated and displayed as a bar chart to visualise the difference in compliance between the four audited weeks.

The third phase was an online user survey which gathered qualitative and quantitative data to elicit the staff views on the use of the transfer checklist and incident reporting. Closed ended questions were asked initially and were followed by open ended questions to expand the reason in written text box. This allowed both qualitative and quantitative results. This phase occurred last and aimed to study the contributing factors relating to the use of the checklist and incident reporting.

To create a diverse participant recruitment and reduce response bias, a systematic sampling technique was used. One hundred members of the ITU were randomly invited to perform the user survey choosing every third NHS email address of the workforce as permitted through local area policy. The survey was available for participants to complete for four weeks between 2nd September and 30th September 2020. To reduce any non-response error, two weeks after the first email, a reminder email was sent out to participants as a prompt to complete. A separate invitation email was sent to each person containing the participant information sheet detailing the study. The consent agreement was placed within the survey along with the questions asked. The survey questions were reviewed by experts within the field as well as non-experts to ensure that the questions were clear, understandable, and appropriate to measure the studied topic prior to being sent to participants. To further reduce response bias, participants were informed that once the survey was completed, the data could not be removed as it was anonymous when entered.

Developing the checklist

The construction of the transfer checklist was created in accordance with the ICS (2019) guideline on 'Transfer of The Critically Ill Adult'. The guideline focusses on three main sections which include:

- Equipment

- Medication
- Monitoring

The transfer checklist was structured using initial communication prompts to reduce errors, followed by sections covering equipment, medication and monitoring as recommended by ICS (2019). The checklist was peer reviewed by key stakeholders prior to being approved for use in clinical audit. This led to two additional checks being added to the checklist. Although not included within the ICS (2019) guidelines, tracheostomy equipment and chest drain clamps were added as relevant and important for transfer in many ITU patients. Complications can occur with tracheostomies including dislodgement, blockage and accidental removal causing a patient to have a compromised airway. In ITU, it is essential to have the appropriate equipment at the bedside to treat an airway emergency effectively. Given that this type of event can occur in any location, it was deemed appropriate to add this equipment to the transfer checklist (The Faculty of Intensive Care Medicine, 2021).

To gain NHS approval for use in clinical practice, a clinical governance meeting occurred that consisted of the director of Critical Care, medical doctors, matrons of Critical Care, quality nurses, nurse managers and Advanced Critical Care Practitioners (ACCP) creating the opportunity for key stakeholders to gain awareness of the project as well as encourage questions to be addressed regarding the implementation,

appropriateness and standard of the checklist as well as the justification for use. After careful consideration, the checklist was deemed suitable for use and approved to be placed within the trusts Critical Care guidelines under ‘transfer.’ The trust agreed for the checklist to be evaluated through audit (compliance) and survey (contributing factors). The evaluation phases were registered on the local trusts clinical audit register (CA06620-Audit, CA06720- Survey).

Implementation

The transfer checklist was approved to be used by Critical Care staff before a patient was transferred to scan. All elements of the checklist were to be completed to achieve optimal safety. Once completed, the checklist was placed into the medical notes for filing and audit.

Nurses caring for patients within the ITU of the Acute Hospital Trust prepare a patient for transfer prior to departure ensuring that the appropriate equipment, medication, and monitoring is optimised and readily available. A patient with an artificial airway or who is critically unwell will require an airway trained doctor to accompany a patient with a nurse on transfer (ICS 2019). The transfer checklist has a signature to be completed by both the nurse and doctor transferring a patient to confirm that the appropriate support has been prepared prior to transfer. Although nurses would prepare the patient for transfer using the checklist, both nurses and doctors within the UK have accountability to

ensure that their practice is safe and reported accurately. Both signatures should be evident on the transfer checklist to confirm both professionals deem the transfer to be safely prepared and all necessary checks have been taken (Nursing and Midwifery Council 2018, General Medical Council, 2024). As a result of this process, all healthcare professionals involved in transfer required teaching on the use of the transfer checklist.

One to one teaching sessions were delivered to staff. The checklist was also added to an internal Critical Care course for teaching on a continually rolling cycle to capture the study population on a more effective scale.

To reduce any resistance to the use of the checklist which can be present in any change management, staff were asked to provide suggestions to improve the initial draft of the checklist prior to approval, encouraging collaborative leadership and shared ownership to motivate key stakeholders.

The education process of this project was crucial in transferring knowledge and raising awareness of the checklist's benefit in practice as the process could reduce resistance to change in increasing understanding of the checklists importance in reducing errors.

Results

Phase one

The initial retrospective incident report between Sept 2017-Sept 2019 found nine incidents relating to transfer. Table one below shows the reason of occurrence for all incidents found between Sept 2017-Sept 2019 taken from the Datix system. All incidents were deemed avoidable.

The retrospective incident report between 1st October 2019 and 30th September 2020 found no reported incidents relating to transfer during the initial pilot period. Although the transfer checklist will have contributed to this decrease in adverse events, it is difficult to demonstrate to what extent through this phase alone.

Phase two

The transfer checklist was audited and piloted over a four-week period between 3rd August 2020- 31st August 2020. The majority of patients received a CT scan (33), and the remaining patients received an MRI scan (3). Overall, of the thirty-six patients that received a transfer between 3rd Aug-31st Aug 2020, 25 had a checklist completed prior to departure making the overall compliance rate 69.4% over the four-week period. Figure one shows the weekly breakdown of compliance.

Compliance during the audit period time ranged from 37.5%-87.5% with an average compliance rate of 69.4% over the audit period.

Week two of the audit highlighted a lower compliance than the other three weeks. There are several factors that could have contributed to this result. During the time of this study the NHS were working within a global pandemic. The acuity of workload during this time was high and staffing levels were low due to sickness. Additionally, external staff were redeployed to support ITU and did not receive the initial education relating to the checklists use. Although this study does not focus on the contributing factor to compliance, the situations mentioned above could have caused a reduction in compliance during week two of this audit.

Phase Three

A survey was introduced to collect staff views and experiences for the purpose of collecting any contributing factors that gave insight into the effectiveness of the transfer checklist.

The staff survey was open to complete for four weeks (2nd Sept -30th Sept 2020) following the compliance audit. Thirty-eight responses were collected, of which thirty-seven were nurses, two of which were ACCP's and one doctor. Whilst a higher majority of nurse respondents was expected due to the checklist being predominantly completed by the nursing profession in the first instance, the proportion of responses display a reasonable representation of the staffing ratio within ITU as the area has a larger ratio of nurses in comparison to other healthcare professionals. Responses were anonymous. The survey provided both

qualitative and quantitative results. For the qualitative data to provide empirical evidence, it was themed using Braun and Clarke's (2006) Six Step Thematic analysis procedure. The open-ended questions within the survey that provided qualitative data were reviewed from the written text box responses. Responses were reread multiple times before coding. Initial codes were then studied to search for themes that were later reviewed to establish definitive themes to provide this empirical data. The quantitative data provided detail into how many participants were aware of the checklist, how many use the checklist, whether the checklist was effective at reducing risk, as well as whether incidents were reported consistently relating to transfer. Figure two shows the quantitative data received from participants.

Data from figure two shows that the collaborative education process was adequate in reaching the staff within ITU, as awareness from all respondents of the transfer checklist had been achieved. 94.8% stated that they used the checklist in practice suggesting that the tool was used by most participants working in ITU. Only two participants stated that they did not use the checklist. The reason for this was explored and resulted in one respondent stating they had never transferred a patient to scan meaning the opportunity to use the checklist had not occurred, and the other stated that they often forget to use the tool indicating that

solutions to this occurrence should be explored in future to reduce omission.

The question that had the most conflicting responses was whether the participants consider incidents relating to transfer are under reported. 50% of participants stated that they felt incidents are under reported suggesting that there is a problem around the culture of incident reporting and highlights the potential magnitude of transfer incidents that may not be seen through official report systems.

Figures three and four provided frequency of themes identified within the qualitative data collected from the survey. Multiple themes were identified by each respondent in some cases, and all were charted to reflect an accurate result.

The final question within the survey *'do you consider incidents relating to transfer are under reported?'* gave the most conflicting results. 50% of participants considered incidents to be under reported. Participants then answered a follow up open-ended question to expand on their reasoning for their response in a written text box. The themes from this included acuity of workload, colleague influence and knowledge of incidents. Participants highlighted that incident reporting is highly dependent on the views of the medical team or nurse in charge. Although 97.4% of participants stated that they always report incidents relating to transfer, 50% of participants believed that incidents were underreported allowing

the assumption that this practice has been witnessed. Although response bias is difficult to eliminate entirely, the questions were validated prior and used both closed and open-ended questions. Sampling was systematic and responses were anonymous with the survey being completed online, all of which can reduce the risk of response bias. Although the results show that 94.8% of respondents used the checklist, compliance differs. As previously mentioned, many contributing factors affect compliance and without receiving a 100% response rate to the survey, it is difficult to accurately determine response bias. However, the data collected regarding incident reporting within the survey shows that 50% respondents consider incidents are underreported, giving reasonable evidence that participants were open when disclosing information.

Discussion

Performing a nurse led intervention was challenging in Critical Care due to the organisational structure, as patient care in ITU is heavily consultant led (The Faculty of Intensive Care Medicine, 2019). In view of ITU being led by consultants, the hierarchical structures presented within healthcare, and the lack of engagement from the medical team noted, the overall engagement could have negatively influenced the

effectiveness and directly impacted the outcomes of the change (The Faculty of Intensive Care Medicine, 2019, Kerrer et al, 2020).

Nurses were the key stakeholders within the change and the engagement shown from nurses were notably better than that of the medical team throughout the study. While literature suggests that a lack of managerial support is often highlighted as a common issue within change, support from the nursing management was adequate for this project, enhanced by the communication between the nursing team (Kerrer et al, 2020). Collaborative leadership may have helped in creating shared goals however, the checklist could also be viewed as removing autonomy as individual judgement is reduced through its use. This is relevant as although the checklist aims to reduce human error, it could be perceived to remove the need for critical thinking skills, thus creating resistance to the change as recognised in literature. Utilising the education team within ITU to support in the knowledge transfer to nurses helped capture the audience on a wider scale.

As a global pandemic (COVID19) began during the study, it had a detrimental impact on the effectiveness of the transfer checklist, particularly in relation to staff engagement. When the UK went into lockdown the admission rate to ITU due to COVID19 increased dramatically with patients requiring a significant amount of support with large numbers of hospitals reporting a high mortality rate overall

(Karemo and Handley, 2020). In view of other countries healthcare systems becoming overwhelmed due to the pandemic, changes were made to ITU staffing, care, and rotas.

Redeployment occurred and teams from other specialities joined ITU as well as newly qualified nurses, increasing the number of healthcare professionals available to provide care to patients (Karemo and Handley, 2020). Although this was a beneficial strategy to combat the pandemic, the project suffered as a result. External staff redeployed to ITU received initial education and training on the role and expectations to aid in providing support to ITU staff, but unfortunately the transfer checklist was not a high priority at this time. The staff entering ITU did not receive the education necessary to understand the use of the checklist which could have had an impact on its use. This resulted in fewer healthcare professionals working in ITU being educated on the checklist.

The global pandemic caused multiple pressures amongst colleagues during the project period and many changes to practice took place rapidly during this time. This can result in transitional fatigue which differs from the typical resistance seen when implementing change, which in turn could have affected compliance (McMillan and Perron, 2013).

Our study has shown the impact a transfer checklist has on reducing incident occurrence. Comparable studies demonstrate a decrease in the number of incidents with similar interventions (Ash et al, 2015, Bérubé

et al, 2017). Although it is clear from the incident reporting system that the study has been successful in reducing the number of incidents reported relating to transfer, the survey suggests that participant perception of whether incident reporting is consistent is conflicting in responses. This could link to a person's knowledge of what constitutes an incident as a lack of incident knowledge also presented within the responses of the survey. However, questioning the culture within a department should not be overlooked, especially as high levels of disengagement from incident reporting across the NHS have been noted in studies, linking negative perception of incidents, investigation process and lack of training as a large contributing factor to underreporting (Bovis et al, 2018). This could suggest that a shift in organisational culture is needed to promote openness to learn from mistakes collectively. It was also highlighted that colleagues were influenced by both the medical and managerial nursing staff on incident reporting. To improve this, teaching sessions on what constitutes an incident should be organised as well as the adoption of a positive approach to learning from incidents to encourage incident reporting and promote confidence, of not only what an incident is, but also how to report in the view of positive learning.

Conclusion

Our study has shown that the use of a transfer checklist prior to departure from ITU reduces the rate of incident occurrence on transfer

increasing patient safety. Staff compliance plays a key role in the success of an intervention and aiming to increase compliance would increase patient safety further.

Conflict of interest

None declared.

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Tables and figures

Table One: Incident occurrence between Sept 2017- Sept 2019

Number of incidents And date M/Y	**Incident cause**
Incident 1. 12/17	Failure to take appropriate equipment to scan
Incident 2. 2/18	Equipment dislodged on turning during scan
Incident 3. 3/18	Medications ran out during transfer
Incident 4. 3/18	Medication ran empty during transfer
Incident 5. 5/18	Failure to transfer patient with necessary equipment
Incident 6. 8/18	Transferred without appropriate medication
Incident 7. 11/18	Prolonged transfer- No MRI safety consent form completed
Incident 8. 8/19	Equipment failure- Pump. No spare taken
Incident 9. 8/19	Prolonged transfer- Patient had no ID band in-situ

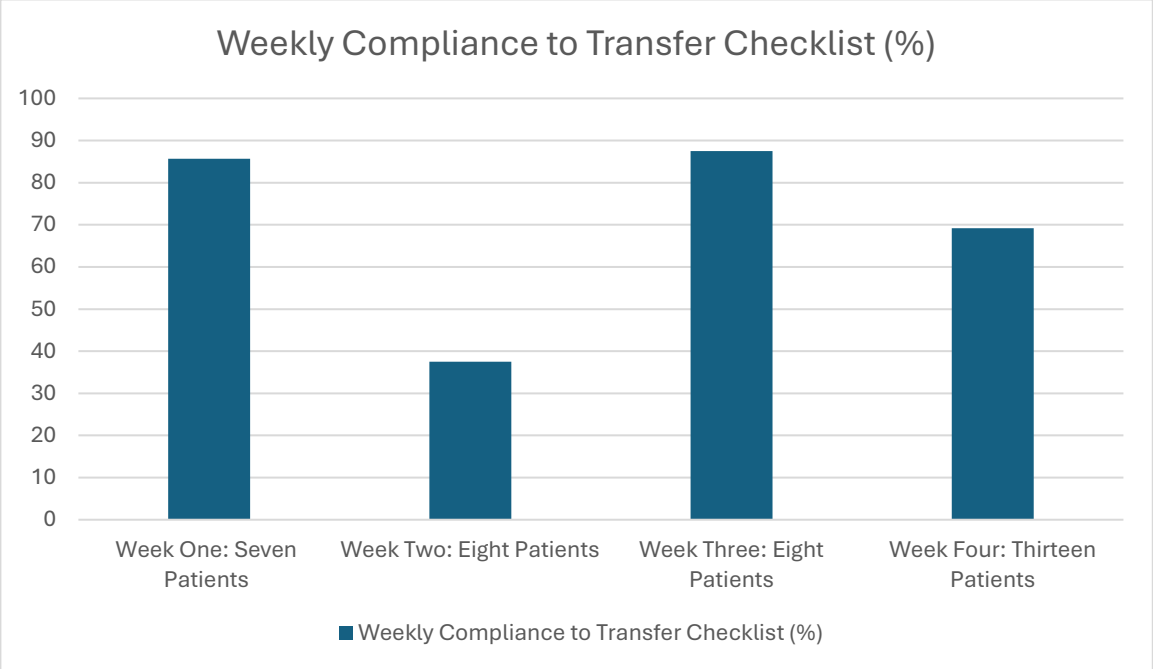

Figure one- Compliance rates in the use of the transfer checklist (%)

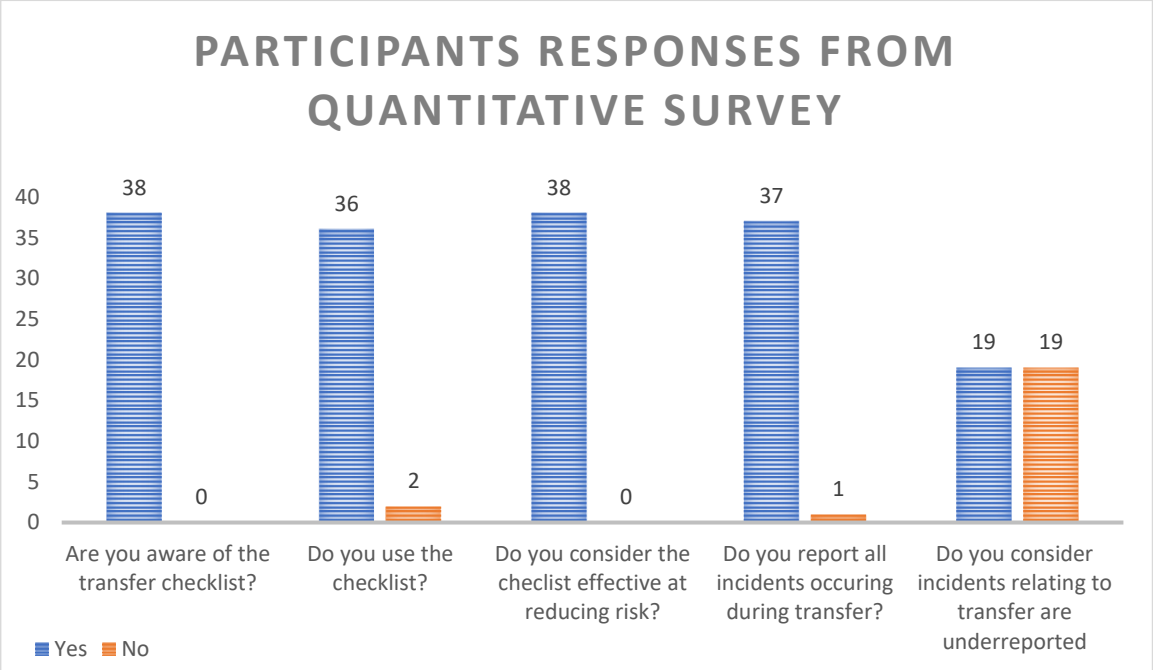

Figure two- Participant responses from the quantitative survey

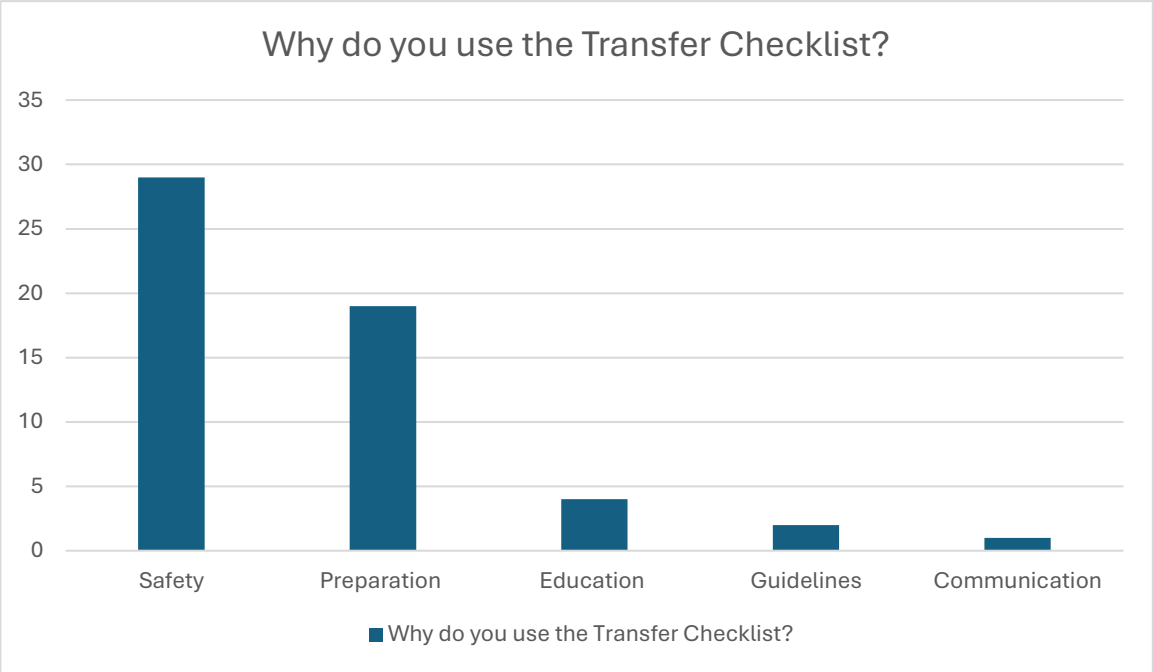

Figure Three- Why do you use the transfer checklist?

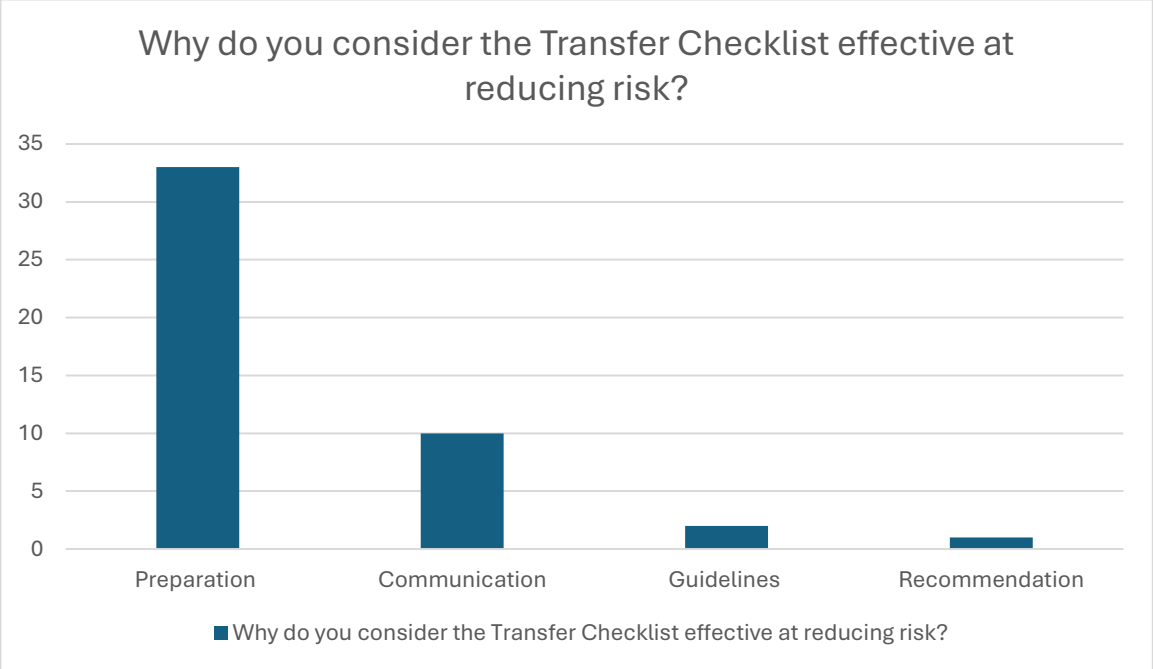

Figure Four- Why do you consider the transfer checklist effective in reducing risk?