

Adverse events experienced with intrahospital transfer of critically ill patients

A national survey

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Abstract

Research that focuses on transfers to and from the intensive care unit (ICU) could highlight important patients' safety issues. This study aims to describe healthcare workers' (HCWs) practices involved in patient transfers to or from the ICU.

This cross-sectional study was conducted among HCWs during the Saudi Critical Care Society's annual International Conference, April 2017. Responses were assessed using Likert scales and frequencies. Bivariate analysis was used to evaluate the significance of different indicators.

Overall, 312 HCWs participated in this study. Regarding transfer to ICUs, the most frequently reported complications were deterioration in respiratory status (51.4%), followed by deterioration in hemodynamic status (46.5%), and missing clinical information (35.5%). Regarding transfers from ICUs to the general ward, the most commonly reported complications were changes in respiratory status (55.6%), followed by incomplete clinical information (37.9%), and change in hemodynamic conditions (29%). The most-used models for communicating transfers were written documents in electronic health records (69.3%) and verbal communication (62.8%). One-fourth of the respondents were not aware of the Situation, Background, Assessment, Recommendation (SBAR) method of patients' handover. Pearson's test of correlation showed that the HCW's perceived satisfaction with their hospital transfer guidelines showed significant negative correlation with their reported transfer-related complications ($r = -0.27$, $P < .010$).

Hemodynamic and respiratory status deterioration is representing significant adverse events among patients transferred to or from the ICU. Factors controlling the perceived satisfaction of HCWs involved in patients, transfer to and from the ICU need to be addressed, focusing on their compliance to the hospital-wide transfer and handover policies. Quality improvement initiatives could improve patient safety to transfer patients to and from the ICU and minimize the associated adverse events.

Abbreviations: HCWs = healthcare workers, ICU = intensive care unit, IRB = Institutional Review Board, SBAR = Situation, Background, Assessment, Recommendation.

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1. Introduction

Critically ill patients usually have a high and complex clinical information burden during their acute illness and admission to the intensive care unit (ICU). Interhospital transfers are likely to increase in frequency with the greater centralization of clinical resources and critical care networks.^[1] Transfers refer to the transition step between different healthcare teams or environments. For example, transitioning of critically ill patients from acute areas (such as emergency room or operating room) to the ICU or from the ICU to a general medical team once the patients' condition is stable within the same hospital or across different hospitals. Furthermore, transfers could refer to handover or exchange of information between clinicians in charge of a patient, such as residents covering patients during an overnight call shift. This is called handover in the literature, and the transfer of patients to another facility or another department in the same hospital is least described but a similarly important topic.^[2]

Transferring patients to and from the ICU may become a high-risk factor of adverse medical events and healthcare workers' (HCWs) dissatisfaction.^[3] In addition, transfers may be challenging and be associated with adverse events and low HCW satisfaction.^[4,5] Improper Communication during handovers is associated with increased adverse events, and many interventions could improve communication and reduce medical errors.^[6] The ICUs are strategic areas where patients are more susceptible to communication breakdowns, given the complexity of these conditions and several team transitions during the patient's care.^[6]

When a new healthcare team assumes care of a patient, they are at risk of a gap in knowledge regarding the patient they are responsible for. There is growing evidence that handover failures are a root cause of two-thirds of hospitals' sentinel events.^[7] Several studies demonstrated that non-standardized handovers led to poor patient outcomes and adverse events. As the learning setting becomes more complex, medical errors remain one of the leading causes of morbidity and mortality.^[7] In a study in a pediatric environment, trainees identified that they were not adequately prepared for 31% of the events occurring at night, 82% of which could have been anticipated, discussed, and expected during handover.^[2] Handovers are a significant moment in the patient's clinical course, with the potential to impact the quality of care.^[8] Understanding that these handovers should be two-way communication is vital when caring for complex ICU patients.^[8]

There is a lack of research that focuses explicitly on transfers to and from the ICU in our region. Therefore, we sought input from HCWs in various Saudi Arabia settings to provide information about their current transfer process to and from the ICU. This study aimed to identify the perceived practices and satisfaction of HCWs in Saudi Arabia, including physicians, nurses, and respiratory therapists, who are involved in patient transfers to or from the ICUs. In addition, we aimed to identify the potential burden of transfers, particularly on patients' care and safety, and to compare them between unstable and critically ill patients (i.e., during transfer to the ICU) and those who are stabilized on their way to being discharged to the general ward.

2. Methods

In this cross-sectional descriptive study, a self-administered questionnaire was used to survey HCWs involved in patient transfers to or from the ICUs across Saudi Arabia in April 2017

during the Saudi Critical Care Society's annual International Conference.

We designed a self-administered questionnaire (Appendix 1, <http://links.lww.com/MD2/A130>) distributed via the Saudi Critical Care Society email groups. The HCWs involved in the study provide care in either the ICU or other acute care areas (emergency room, ambulance, or operating room) or the general ward.

Questions were prepared based on the literature referred to earlier, outlining the expected adverse events that might affect or occur during any patient transfer process, particularly in a critical care setting.^[9]

A multidisciplinary team focus group refined the wording and format of the questions before conducting a pilot test with a group of experts from our institution's ICU department. Questions marked as unclear were removed from the questionnaire. It was then piloted in our department (pediatric ICU) and tested to ensure its clarity before sending it to the target group.

The survey questionnaire was sent electronically, and consent to participate was provided on the survey's first page. Participation in this research was voluntary, and all data were collected confidentially and anonymously.

The questions were clustered into the following 3 categories:

1. The first part of the questionnaire was questions regarding the participants' demographic data, such as age, gender, credentials, discipline, and length of experience.
2. The second part focused on 2 types of the transfer process, that is, transfer of the critically ill patients to the ICU and transfer of a stable patient from the ICU to the floor. For each situation, we requested the participants to indicate how frequently they participated in this type of transfer per month of clinical service and asked them to rate their opinions regarding all the questionnaire statements.
3. Finally, they were requested to indicate the manner of patient information handover.

Responses were assessed using the Likert scales and frequencies from 1 (totally disagree) to 5 (totally agree). Then, we requested the participants to indicate the frequency and type of adverse events experienced during the transfer process.

This study received ethical approval from the Institutional Review Board of King Saud University (#16/0209/IRB). HCWs were informed that participation was not mandatory and assured of their responses' anonymity and confidentiality. Consent was obtained from the participants before their enrollment into this survey.

2.1. Statistical analysis

Means and standard deviations were used to describe continuous variables, while frequency and percentage were used to describe categorical variables. Multiple response dichotomy analysis was used to describe multiple response questions. The bivariate chi-square test of association was used to assess the correlation between categorical variables, and Pearson's bivariate test of correlation was used to assess associations between continuous variables. The independent group *t* test was used to assess HCWs' binary categorical variable levels for statistically significant differences in the mean number of observed patient transfer-associated complications. Moreover, the one-way analysis of variance test was used to assess the mean observed patient complications associated with the transfer process across the

employee measured categorical variables with more than 2 levels. The adjusted test statistics and *P* values were quoted where violations of the statistical assumptions of all bivariate tests of association were noted.

3. Results

A total of 312 HCWs participated in this study; their work experience ranged from less than 2 years to more than 10 years, with most of them (56.2%) having 3 to 10 years of ICU work experience. Approximately half of the participants were nurses (55%), whereas the remaining were senior physicians (consultants, assistant consultants, senior registrars, and registrars, 35%) and training residents (10%).

The average range of patient transfers per participant in this survey was approximately 5 to 8 times per month because 47% of participants reported the transfer of approximately 5 to 8 patients per month to the ICU, whereas 30% of HCWs transferred patients 5 to 8 times from the ICU to the ward. Approximately 12.5% of participants had more than 12 patient transfers to the ICU; only 8% of HCWs transferred more than 12 patients per month from the ICU to the ward (Table 1).

The satisfaction of the HCWs with the transfer process of critically ill patients in their health institution and the satisfaction

with the written guidelines did not significantly differ across the 2 transfer directions, that is, either to or from the ICU. On the contrary, regarding the occurrence of adverse events during the transfer, the participating HCWs agreed in the higher occurrence of adverse events during the transfer to the ICU or just on arrival to the ICU compared with the transfer from the ICU to the floor (Table 2).

The analysis with Pearson's test of correlation suggested that the HCW's perceived satisfaction with the hospital guidelines of patient transfer showed significant negative correlation with their reported transfer-related complications ($r = -0.27$, $P < .010$), reflecting the association of the HCW's perceived satisfaction with in-hospital guidelines of patients transfer and the less encountered patients' complications. On the other hand, the HCW's dissatisfaction was significantly associated with the greater number of reported patients transfer-related complications ($r = 0.31$, $P < .010$).

The most common complication encountered by HCWs during the transfer process to the ICU was deterioration in respiratory status (51.4%), followed by deterioration in hemodynamic status (46.5%). Medication error was mentioned only in 18.8% of adverse events. On the other hand, the most common complication during the transfer process from the ICU to the ward was also deterioration in respiratory status (55.6%), followed by missing clinical data (37.9%) and deterioration in hemodynamic status (29%) (Table 3).

Different methods were used to communicate patient information during transfer. The most commonly used methods were documentation in electronic health records and verbal communication between colleagues. One-third of participants (108) relied on writing patient data on paper, whereas 16 participants reported no specific documentation at all. Approximately 49% of the respondents used the Situation, Background, Assessment, Recommendation (SBAR) method for patient handover for all transfers, whereas 32 (11%) used it for some transfers. Seventy-three (25%) HCWs were not aware of this communication method, and 43 (14.8%) did not use SBAR during patient transfers (Table 4).

In the bivariate analysis of the factors contributing to the transfer process complications, it has been found that complications were more associated with less experienced HCWs, although this difference was not statistically significant ($P = .14$). It has also been observed that complications were more frequent in patients transferred by residents than by consultants ($P < .05$). Furthermore, transfer to the ICU was found to be associated with an increased number of adverse events compared with that from the ICU to the ward ($P < .05$). Respondents who reported a high frequency of monthly transfers reported a higher incidence of transfer-related adverse events ($P < .05$). The impact of using the SBAR method for handover did not make a significant difference in the frequency of occurrence of adverse events during intrahospital transfers of critically ill patients.

4. Discussion

This cross-sectional national survey aimed to identify the satisfaction of HCWs involved in the patient transfer to or from the ICUs in Saudi Arabia. It also aimed to identify the potential burden of transfers on patients' care and safety, comparing those who have been transferred to the ICU (acutely ill and critical) to those who had been transferred out from the ICU to general wards (more stable).

Table 1
Respondent demographic and professional characteristics.

	Frequency	Percentage
Sex		
Male	94	32.4
Female	196	67.6
Experience years		
≤2 yrs	56	19.3
3–5 yrs	81	27.9
6–10 yrs	82	28.3
>10 yrs	71	24.5
Specialty		
General floors	63	21.7
Pediatrics critical care	136	46.9
Adult critical care	91	31.4
Clinical role		
Consultant physician	102	35.2
Assistant (residents) physician	29	10
Other HCWs (nurses)	159	54.8
Ever transferred patients from the ICU to the wards for the last 2 yrs		
Yes	243	83.8
No	47	16.2
Number of transfers to floors last month		
None	60	20.7
1–4 times	82	28.3
5–8 times	36	12.4
9–12 times	37	12.8
>12 times	75	25.9
Ever transferred patients from wards to the ICU for the last 2 yrs		
Yes	279	96.2
No	11	3.8
Number of transfers to the ICU last month		
None	21	7.2
1–4 times	131	45.2
5–8 times	34	11.7
9–12 times	27	9.3
>12 times	77	26.6

ICU=intensive care unit.

Table 2
Comparison of HCW perceptions of the patient transfer process to the ICU and to the floors.

	Satisfaction with the patient transfer process/likelihood of occurrence of events		P
	To the ICU Mean (SD)	To the floor Mean (SD)	
May need to rephrase the items			
My hospital's actual process of transfer of critically ill patients is adequate for patients' needs.	3.91 (1.1)	4 (1.2)	.677
My hospital has clear written guidelines for the admission of patients to and from the ICU.	3.92 (1.3)	3.92 (1.3)	.105
Unexpected events are common during our patients' transfer.	2.60 (1.3)	2.3 (1.2)	<.001
Unexpected events are common just after our patients' arrival.	2.70 (1.3)	2.5 (1.2)	.008
I am satisfied with our transfer process of critically ill patients.	3.64 (1.3)	3.9 (1.2)	.014

ICU=intensive care unit.

Table 3
Frequency of complication during transfer to the ICU and to the floors.

	Frequency of complication during transfer	
	To the ICU n (%)	To the floor n (%)
Deterioration in respiratory status (compared with pretransfer)	126 (51.4%)	94 (55.6%)
Deterioration in hemodynamic status (compared with pretransfer)	114 (46.5%)	49 (29%)
Missing clinical information (e.g., missing lab or management plan)	87 (35.5%)	64 (37.9%)
Self-extubation/loss of advanced airway	56 (22.9%)	0
Decreased level of consciousness	50 (20.4%)	30 (17.8%)
Medication errors	46 (18.8%)	40 (23.7%)
Aspiration	43 (17.6%)	22 (13%)
Others	15 (6.1%)	22 (13%)
	n=245	n=169

In general, this study reported high satisfaction among HCWs concerning the transfer process used for critically ill patients to and from the ICU. This finding most likely due to more utilization and adherence to transfer policies with a formal handover tool that is being implemented across many health care facilities as a significant proportion of our participants reported the use of electronic health care system, verbal communication, and SBAR technique during patients handover . . . This is in agreement with Van Graafeiland et al, who suggested establishing a standardized patient severity of illness criteria, use of standardized tools, and team-to-team handover processes to improve patients' handover and transport process.^[10] A similar finding was noted when a customized transfer tool was implemented to

improve transitions from the ICU to the ward where half of the clinicians reported that the preintervention transfer process was satisfactory and it has been found that the implemented transfer tool significantly improved the transfer process (93.3% vs 48.8%, $P=.03$).^[11]

The use of handover and transition standardized tools among HCWs within the hospital has been found to be associated with improved patient outcomes and to improve overall handoff quality.^[7] This, joined with a vigorous sustainability model, enabled hospitals to adopt the change and sustain its benefit, improving teamwork, workflow, and communication.

The reported transfer-related adverse events among our participants could be due to their relatively more involvement in patients, transfer as they had been involved in patient transfer, to and from the ICU, with an average of 5 to 8 times every month. This might highlight the importance of existing transfer protocol and guidelines and its implementation with compliance to the overall process of transfer.^[12,13]

The present study showed that, the most common reported adverse event in patients who were transferred to and from the ICU was deterioration in respiratory status. This is similar to Droogh et al, who found that the most common adverse medical events among patients transferred to and from the ICU were cardiovascular or respiratory events.^[14] A possible explanation for such finding could be due to shifting the patient from the ICU or the wall ventilator to a portable transport ventilator which may be associated with temporary deterioration of the respiratory status either due to derecruitment upon ventilator circuit disconnection. Moreover, the potential differences of

Table 4
Methods used for patient transfer and handover.

	Frequency	Percentage
Used patient transfer methods		
Verbal (from colleague to colleague)	174	62.8
Written in electronic health record (EHR)	192	69.3
Written on paper	108	39
Other (please specify)	16	5.8
Degree of SBAR handover method use		
I am not aware of this technique.	73	25.2
I know SBAR, but we do not use it in our ICU transfers.	43	14.8
SBAR is used for some ICU transfers.	32	11
SBAR is used for all our ICU transfers.	142	49

ICU=intensive care unit, SBAR=Situation, Background, Assessment, Recommendation.

settings between the ICU or wall ventilator and the transport ventilator could be another possible factor. Furthermore, the patient's overall condition and stability for transfer are vital factors that can impact the occurrence of transfer-associated complications that were not studied in the current survey. A similar finding has been reported by Waydhas, who reported that the change from the ICU ventilator to a transport device or manual ventilation might lead to respiratory adverse events. Therefore, he suggested using monitoring equipment, particularly tidal or minute ventilation, in patients requiring ventilation to decrease unintended ventilation-related complications.^[13] Recent literature has also reported that the intrahospital transfer of patients with mechanical ventilation can significantly increase the potential patient's risk.^[15]

Similar to our findings, it has been reported that the ICU patients involved in an intrahospital transfer are at risk of various adverse events, such as hypotension, desaturation, and dislodged peripheral lines.^[16] Such deteriorations, especially when transferring patients to a higher level of care in the ICU, could be related to several factors, such as their underlying disease status affecting their respiratory and cardiovascular stability and functional status. It is also well known that seriously ill patients might get worse between the time of decision-to-transfer and the actual time of transfer. It has been reported that delays in ICU transfer are linked with increased hospital length of stay and mortality.^[17]

Such findings might highlight the initiation of effective surge capacity policies and implementing management protocols to further stabilize such patients before their transfer to the ICU to ensure a safe transfer for such patients.

Moreover, pretransfer risk recognition and providing appropriate care levels are essential to curtailing the adverse events during the transfer. For example, patients transferred during night shifts and on inotropic/vasopressor support have a higher rate of adverse events so that planning could minimize their transfer risks.^[16]

On the other hand, adverse events occurring during or after transfer from the ICU to the ward can be attributed to the step down in the level of care due to the well-known difference in clinical focus among HCWs in different service areas.^[18] This transition of care level is understandable for HCWs; however, some families show dissatisfaction soon after transfer to the ward because they compare continuous monitoring in the ICU with only supportive care in the ward. This dissatisfaction can pressurize the caring team, resulting in adverse events owing to the tense environment.

One of the significant factors contributing to adverse events during patient transfer is the communication gap between medical teams that can lead to management gaps and unexpected events.^[18] In a study focused on the analysis of physician progress notes, Brown et al found a wide variation in the documentation during patient care transition from the ICU to the ward. Another report from the Canadian Institute for Health Information documented that unintended harm occurs in 1 in every 18 hospitalized patients owing to communication issues.^[12]

In the present study, we found that different methods were used for communicating transfer information. As HCWs were more satisfied with their respective hospital guidelines regarding the transfer of patients, their respective perceptions of problems and occurrence of complications associated with this process tended to decrease on average; the effect was statistically significant ($P < .001$).

Although our self-reported study did not indicate the impact of using the SBAR technique for handover on the frequency of adverse events, this remains one of the main team interventions to improve performance and outcomes.^[19] In their systematic review of articles published between 2008 and July 2018, Buljac-Samardzic et al found that the number of studies on team interventions has increased significantly. In addition, they found that principle-based training and simulation-based training can provide the highest potentials to achieve the goals in team functioning. Furthermore, during the COVID-19 crisis, as the HCWs' communications may be limited with the PPE, some hospitals supplemented the standard handover process with other modalities, such as hand gestures, such as the "Nightingale Communication Method," or a virtual handover that incorporated the SBAR components.^[20,21]

Our study revealed that the HCWs' satisfaction with their hospital transfer policies predicted fewer complications related to the ICU transfers. A systematic review showed that handover forms are effective interventions to improve the quality of patient's handover between the ICU and general ward.^[22] Moon et al found significant improvement in HCWs' satisfaction after implementing a bundled intervention that included a direct telephone report, an added mnemonic to standardize the endorsement process, and a modified template for postoperative documentation.^[23] Customizing similar interventions to a healthcare system could therefore boost the satisfaction of the HCWs and improve patients' safety.

5. Limitations and future directions

This cross-sectional survey might be subjected to recall bias, and the true incidence of adverse events may differ. The number of participants may not be representative of different HCWs in a similar percentage; therefore, the results need to be validated in future studies to become more generalizable to other populations. Our findings could be utilized as foundational research that can be used to launch a subsequent exploration for the communications methods used during handover and transition of care and its impact on transfer-associated adverse events.

6. Conclusion

Hemodynamic and respiratory status deterioration is representing significant adverse events among patients transferred to or from the ICU. Factors controlling the perceived satisfaction of HCWs involved in patients, transfer to and from the ICU need to be addressed, focusing on their compliance to the hospital-wide transfer and handover policies. Quality improvement initiatives could improve patient safety to transfer patients to and from the ICU and minimize the associated adverse events.

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