

A LITERATURE REVIEW OF ORGANISATIONAL, INDIVIDUAL AND TEAMWORK FACTORS CONTRIBUTING TO THE ICU DISCHARGE PROCESS

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INTRODUCTION

Improving patient safety and patient outcomes has emerged as a priority for hospitals in the last 20 years. The US Institute of Medicine's (IOM) report to Congress "To err is human" provided a coherent set of directions that set the agenda for patient safety worldwide.^[1] The IOM defines healthcare quality as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge".^[2] The IOM definition suggests a broad approach to measuring healthcare quality in terms of data-desired outcomes and related processes of care. The IOM's six aims of health care, safe, effective, patient-centred, timely, efficient, and equitable,^[2] provides an direction for improving patient safety and the quality of health care. It is against this context that a literature review of the ICU discharge process was conducted.

The Intensive Care Unit (ICU) is an essential component of most large hospitals in the modern healthcare system, providing critically ill patients with high quality care. In addition, patients undergoing major surgery often require ICU admission postoperatively. In Australia in 2004-2005, elective surgery accounted for 31.4% of ICU admissions and emergency cases accounted for 46.3% of ICU admissions.^[3]

Intensive care resources are limited and expensive commodities. In 2002-2003, one study found that the average cost of an ICU bed in Australia was A\$2670 per day and the total stay per patient was A\$9852.^[4] Australia has significantly fewer ICU resources than other western countries.^[5] In 2002, the available ICU beds per 100,000 population was 25 in Germany, 24 in USA, 11 in Switzerland, and 10 in The Netherlands.^[5] In contrast, Martin et al.^[3] reported that in 2004-2005, there were only 6.1 ICU beds per 100,000 populations in privately and publicly funded institutions in Australia. Using the number of beds per population to argue shortage of beds is debatable, because research shows that patient acuity is lower in countries with more ICU beds. This may indicate that some ICU resources might be more optimally utilised.^[6] However, a lack of beds relative to population and the high cost suggests that optimal use of the existing ICU beds is imperative in coping with the increasing demand for ICU beds in Australia.

It would appear that optimal bed flow is critical to ensure high quality of care under current ICU capacities, given that ICUs are often under forward pressure from areas such as Emergency Department (ED) or Operating Theatre (OT) for beds^[7]. Discharging patients is one way to relieve this pressure but clearly the risk of premature discharge^[8] must be managed. At the same time, lack of beds in other parts of the hospital can also cause discharge delays. One study identified that 46% of unsuccessful discharges from ICU were due to a lack of ward beds or disagreement over admitting services in the wards, and one in six discharges were unsuccessful on the first attempt.^[9] Often patients cannot be admitted into ICU because it is full, which may be because the ICU beds have been taken by patients waiting for ward beds, a situation referred to as discharge delay, “bed-block” or outflow limitation.^[10, 11] On occasion, a patient maybe discharged prematurely to the ward because a sicker patient from ED or OT needs the ICU bed.

Discharging an ICU patient is a complex, multidisciplinary process, involving collaboration among physicians, nurses, managers, ward clerks, and support systems, both in ICU and across other hospital departments. Effective teamwork and coordination among staff can optimise the

ICU patient discharge process and patient outcomes. The following section discusses the conceptual framework for this literature review.

The conceptual framework of the review: Factors influencing ICU patient discharge processes

The ICU patient discharge process may begin with a patient's admission to ICU when some of the discharge paperwork is started, and does not finish until the patient is transferred to the ward. Many factors can potentially cause problems. In the last two decades there has been increasing interest in researching factors that may contribute to patient outcomes in hospitals.^[12-15] In the 1990s, Reason^[13, 16] identified that adverse events in complex healthcare systems may result from either active or latent failures. Active failures in a hospital setting are usually "committed" by the person closest to the patient, and this can lead to immediate adverse patient events. Latent failures, in contrast, refer to less apparent failures of organisation or design that contributed to the occurrence of errors.^[17] Latent failures often arise from management decisions that determine working conditions. Although active failures are much easier to identify than latent failures, identifying the latter could have a much larger effect on improving the working environment and patient safety.

Following this work, Vincent^[14] and Pronovost et al.^[15] identified a framework of six factors that may contribute to adverse events in clinical practice. The factors included: (i) *patient factors*, including clinical conditions, language, and social factors; (ii) *task factors*, including availability or use of protocols, test results, and accuracy of test results; (iii) *individual factors*, including knowledge, skills, competence, fatigue, failure to follow established protocols/procedures, motivation and attitude, and physical, mental health; (iv) *teamwork factors*, including verbal or written communication during handover, routine care and crisis, supervision and seeking help, and team structure and leadership; (v) *working conditions*, including staffing levels, skills mix,

workload, availability or maintenance of equipment, and administrative and managerial support; and (vi) *organisational and management factors*, including financial resources, time pressures, and physical environment.

Based on these earlier frameworks, in this literature review, factors contributing to the ICU patient discharge process were grouped into four broad domains: organisational factors, individual factors, teamwork factors and patient factors (See Figure 1). Working conditions, organisational and management factors together were considered as organisational factors. The aim of this literature review was to critically analyse current literature related to factors that influence the ICU patient discharge process. It examined how organisational factors, individual factors and teamwork factors influence the ICU patient discharge. Patient factors, a widely well-researched topic, ^[18, 19] were excluded to limit the review to a manageable length.

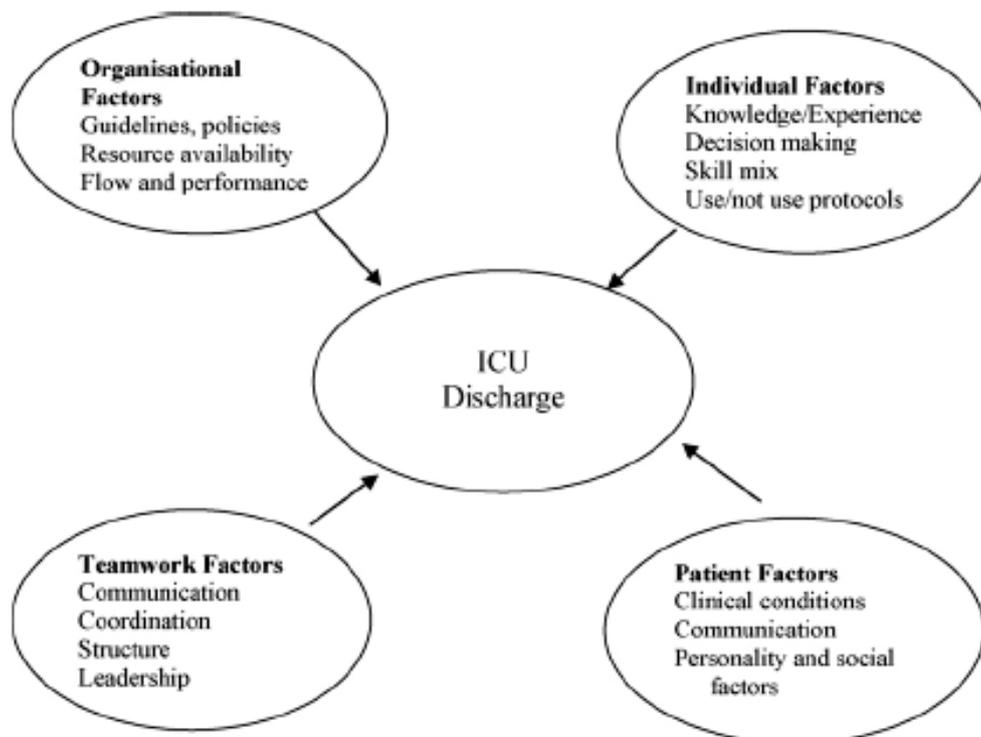


Figure 1 The ICU patient discharge process conceptual framework.

METHODS

Databases including CINAHL, MEDLINE, PROQUEST, SCIENCE DIRECT were searched using key terms such as ICU discharge, discharge process, discharge policies, ICU guidelines and policies, discharge decision making, ICU and organisational factors, ICU and human factors, and ICU patient transfer. Web search and the “snow-balling” search of reference lists of articles were also used to locate relevant literature.

On the basis of this literature, the “ICU patient discharge process conceptual framework” was devised to facilitate the inclusion of articles for the review. Published policy, guidelines, and government reports related to ICU or High Dependency Unit (HDU) patient discharge, primary research articles on the influence of organisational factors, individual factors, and teamwork on ICU patient discharge processes and subsequent patient and organisational outcomes were included with no limitation on the year of publication. Articles were included if they were: 1) either qualitative or quantitative studies; 2) carried out in any type of ICU/HDU; and 3) directly related to the ICU patient discharge process. Articles were excluded if they were not specifically about ICU/HDU patient discharge. A total of 21 articles were included in the review.

RESULTS

Among the included articles, ten articles were on organisational factors including four reports, policies and guidelines, and organisational interventions regarding ICU discharge (see Table-1), five were on individual factors (see Table-2), and six were on teamwork factors (see Table-3).

Organisational factors

Articles on guidelines and policies, resource availability, and organisational interventions on flow and performance, were included under one broad domain as organisational factors (see Table-1)

for discussion. Reports, policies and guidelines articles are not listed in the Table-1 due to the large amount of information included and the word limits of this paper.

Guidelines and policies

Only a few critical care organisations have written guidelines for the ICU patient discharge process. The Society of Critical Care Medicine (SCCM)^[20] provides the most detailed admission and discharge criteria, focussing on diagnostic groups, clinical judgement of the need to support or monitor organ functioning, objective physiological parameters, and the stability or instability of physical conditions. According to the SCCM, ICU patients can be discharged when they are deemed to “no longer need ICU services”. However, when there are limited ICU beds available, patients can be admitted and discharged by *triage* instead of through routine review processes. Due to the risks associated with triage, such as premature discharge,^[8] the SCCM recommends that only ICU directors have the authority to make the decision to admit and discharge patients using this method.

The Intensive Care Society (ICS)^[21] Guidelines on Admission and Discharge to ICU and High Dependency Unit recommends the type of patient that should be admitted to the ICU; however, discharge criteria or guidelines are not specified. The Australian and New Zealand Intensive Care Society (ANZICS) has issued a document on minimum standards for ICUs which specifies that all ICUs should have clearly defined policies for discharge of patients, but it does not have a guideline for ICU patient discharge.^[22] Although guidelines and policies are considered effective management tools to reduce ICU length of stay and improve the utilisation of ICU resources,^[23-25] one study indicated that only 18 out of 46 (39%) ICUs had written discharge criteria.^[26] Heidegger et al.^[27] suggested that lack of agreement in clinical decision making exists in ICU patient discharge.

Resources

Many studies found that discharges from ICU at night were associated with increased mortality.^[8, 28-31] Goldfrad and Rowan^[28] identified that patients discharged from ICU at night experienced 2.5-fold greater mortality than patients discharged during the day. They also found that only 44.1% of patients discharged at night were fully ready to be discharged, compared with 86.3% of those discharged during the day. In an Australian study, Duke et al.^[8] found that patients discharged to the ward during the night shift had higher Acute Physiology and Chronic Health Evaluation (APACHE II) scores^[32] and crude mortality (no statistical significance). Their research results suggested that there was a higher prevalence of delayed discharge (37%) and premature discharge (2%) in association with night-shift discharge.

However, after-hours discharge still exists. In one Australian ICU, between 1992-2002, the number of patients being discharged to wards after-hours was 22% on evening shift (between 1500-2200 hours) and 6% on night shift (between 2200-0800 hours).^[31] In 2003-2005, out of 70749 episodes of ICU care within a 12-month period in all Australian ICUs, 3036 (4.3%) cases were discharged out-of-hours.^[3]

At other times, patients were unable to be discharged because of resource constraints on the wards. Williams and Leslie^[33] found that 81% of delayed ICU discharges were due to a lack of available beds in the hospital and average delay time for ICU patient discharge was 21.3 hours. Levin^[9] found that 16% of planned ICU discharges were unsuccessful on the first attempt due to lack of ward beds. It appears that ICU patient discharge and bed flow is largely influenced by the resource constraints of hospitals and the ICUs. After-hours discharge, although proved to be associated with increased mortality, coexists with the shortage of ICU beds.

Organisational interventions

The articles on organisational interventions that influence ICU discharge are summarised in Table

1. Many researchers have studied interventions to improve discharge processes in order to improve patient safety and make more resources available for those patients who desperately need ICU service.^[11, 34, 35] Crocker and Keller^[36] reported that after removing the unnecessary steps in the patient discharge process, communication among staff improved and the patient journey was much smoother. Chaboyer et al.^[11] found that the use of an ICU liaison nurse could significantly reduce the discharge delay and improve ICU nurses perceptions of discharge planning; the liaison nurse coordinated the patient transition from ICU to ward and ensured continuity of patient care. Perlmutter et al.^[35] trialled a programme to identify the causes of discharge delays in one American neonatal ICU. Identification of problems and implementation of strategies to improve the patient discharge process reduced discharge delays and resulted in cost savings of \$184,745 for one year for the hospital. The use of an ICU outreach team, trialled by various researchers in the UK,^[34, 37, 38] was shown to decrease the patient hospital mortality rate. Ball et al.^[34] found that the ICU outreach team, which reviewed patients on the wards after discharge from ICU, increased the patients' hospital survival by 6.8%, although this trend did not reach statistical significance.

Table-1: Organisational Factors Influencing the ICU Discharge Process (excluding policy documents, reports and guidelines)

Author (year) ^{ref#} Country	Research Method and Instruments	Setting and Sample	Findings	Comments and Limitations
Chaboyer et al. (2006) ⁽¹¹⁾ Australia	Prospective block intervention (control and intervention blocks over 4-month period with one month wash out period). Intervention: An ICU liaison nurse. LOS [†] from the hospital clinical database.	ICU patients who had ≥ 3 days in a tertiary referral hospital. Control group: 101 patients Intervention group: 85 patients	<ol style="list-style-type: none"> Hours of discharge delay were significantly higher in the control group. 36.6% of patients experienced delay of at least 2 hours; in the control group, the risk of delay was 3.2 times more than the intervention group. 22% of patients experienced delay of at least 4 hours and the risk of delay was 2.5 times more than the intervention group. 	The liaison nurse's role reduced discharge delays; this can optimise the ICU resource utilisation. Limitations: <ol style="list-style-type: none"> Examination of reasons of discharge delays and ICU exit block is needed to verify the findings. Single site.
Crocker & Keller (2005) ⁽³⁶⁾ UK	Prospective Action research. Patient discharge process mapping and timing. Analysing patients' journey and making small step changes. Intervention: A new process led by the nurse caring for the patients in HDU. A discharge tool was developed and audited.	10-bed HDU. * Multidisciplinary team working in one adult HDU.	<ol style="list-style-type: none"> There was a considerable delay in discharging patients pre-intervention. There were too many hand-offs, too many steps in the process, and few of them had any value to the patient's experience. Perceived benefits after implementing a new nurse-led process: 1) Patient transfers became smoother and patients felt more prepared. 2) Communication was better and more efficient. 	Streamlining the process and nurse-led discharge has perceived benefits. Limitations: The benefit was yet to be evaluated in relation to patient outcomes or shortened discharge delays. Only action phase is reported in this paper.
Levin et al. (2003) ⁽⁹⁾ Israel	A prospective, observational study. Measurements: Age, APACHE II [®] scores at discharge, and discharge delay.	11-bed general ICU of a 750-bed urban university hospital. All ICU patients judged appropriate for discharge by the ICU attending physician during a 6-month period. 856 attempted discharges in 706 patients were analysed.	703 (82%) discharges were successful within 24 hours. 3.33% unsuccessful discharges were deferred because of medical deterioration: 21% at the request of the ward physicians or nurses, and 46% because of administrative difficulties (lack of ward bed space or disagreement over admitting service).	ICU outflow limitation occurs in up to 1 in 6 discharges. Limitations: Single site. Factors in other departments were not measured.

Individual factors

Table 2 outlines five articles found on individual factors influencing the ICU patient discharge process. Heidegger et al.^[27] reported that lack of agreement in clinical decision making exists around ICU patient discharge. Brand^[39] found that critical care nurses played a very important and proactive role in bed management, especially when there was pressure on bed availability when discharging patients from the HDU. However, they were not comfortable in contributing to the patient discharge decision-making process, as they saw it as a medical responsibility. Watts et al.^[40] found that 9% of critical care nurses claimed lack of knowledge was one of the important factors impeding the discharge planning process in critical care, consistent with earlier studies.^[41] Other studies found that the main reason that ICU patients could not be discharged was the ward staff's lack of knowledge and skills to look after the higher acuity patient.^[9, 11, 30, 42, 43] Chaboyer et al.^[44] found that an ICU liaison nurse helped ward nurses to feel more equipped with knowledge and skills, and more confident about accepting patients from ICU.

Table-2: Individual Factors Influencing the ICU Discharge Process

Author (year) ^{ref.#} Country	Research Method and Instruments	Setting/Sample	Findings	Comments and Limitations
Brand (2006) ⁽³⁹⁾ UK	Ethnography. Direct observation and unstructured interviews.	Nurses from one adult HDU.	Themes: 1. Nurses took a submissive role in the nurse-doctor relationship in order to avoid conflict. 2. Nurses took a holistic approach which was different from other health professionals. 3. Nurses had substantial responsibility in bed management and became more proactive in decision making, especially when there was pressure on HDU beds. 4. ICU nurses were uncomfortable with discharge decision making, even though they liked to contribute. Three major themes emerged: 1. The role behaviours of the liaison nurse included the professional characteristics of the individual and the primacy of clinical liaison as a role descriptor. 2. Contextual demands were environmental characteristics relevant to providing patient, family and staff support. 3. Outcomes of the role were perceived to include environmental preparation and education.	Critical care nurses play an important role in the discharge process in bed management. Limitations: Single setting.
Chaboyer et al. (2005) ⁽⁴⁴⁾ Australia	Prospective qualitative case study. Semi-structured in-depth interviews.	10 ward nurses from one tertiary hospital that utilises an ICU liaison nurse.	1. Responsibility for patient management was assigned in 91% of centres to the ICU team directing patient care. 2. Only 22% of responding centres used written discharge guidelines. 3. Half of the respondents used at least 10 of 15 proposed criteria to decide patient discharge. 4. Discharge practices varied in hospitals with different level of resources. 5. The ICU director's level of experience was not associated with the number of criteria used. In the five clinical scenarios there was wide variation in discharge decision.	This study suggested the liaison nurse role can provide educative and empathic support to ward nurses. The ICU liaison nurse could empower the ward nurses with more complex knowledge to make patients' transition from ICU smoother. Limitations: Small sample in one hospital, which could not be generalised. There is a lack of agreement in discharge decision making. Limitations: How the lack of agreement relates to patient outcome was not investigated.
Heidegger et al. (2005) ⁽²⁷⁾ Switzerland	Prospective survey. Questionnaire inquiring about ICU structure and organisation mailed to participants. Level of monitoring, intravenous medications, and physiological variables were proposed as elements of discharge decision. Five clinical situations were presented with request to assign a discharge disposition.	55/73 medical directors of adult ICUs affiliated with the Swiss Society of Intensive Care Medicine participated, representing 75% of all adult Swiss ICUs.		

Table-2: Individual Factors Influencing the ICU Discharge Process (continued)

Watts et al. (2005) ⁽⁴⁰⁾	Prospective exploratory descriptive study. 31-item questionnaire. 1:1 semi-structured interviews.	218/502 Australian critical care nurses identified from ACCCN (Victorian database) completed survey. 13 nurses were interviewed.	Important factors that contribute to discharge planning in ICU were 1. 33% due to inadequate communication. 2. 30% unplanned discharges. 3. 17% lack of time. 4. 9% lack of knowledge. 5. 7% continuity of staff.	Key factors were communication and time constraints. Limitations: Sample was ACCCN members only. Other organisational factors not investigated.
Whittaker & Ball (2000) ⁽⁴³⁾	Exploratory pilot study. Questionnaires. Semi-structured interviews.	Sample: qualified nursing staff (RN and enrolled) from two wards receiving adult ICU patients in a large London teaching hospital. 36 questionnaires were sent to nurses Response rate: 36%. 7 nurses with different level qualification were interviewed.	1. Most staff thought communication could be improved, especially the handover process. 2. Main problem areas were resources, physical well-being and relatives. 3. Lower grade nurses felt “a sense of dread” and “depressed” when receiving ICU patients due to insufficient information given to them by ICU nurses.	Ward nurses believed handing over patient is an issue. Phone handover should be brief. Face-to-face handover should be most inclusive. Limitations: It is a pilot study. Further study on a larger scale is required to examine if the findings are consistent across the hospital.

Teamwork

Table 3 listed six articles regarding teamwork factors related to ICU processes. The role of effective teamwork in accomplishing complex tasks has been well studied.^[45] In large organisations, teams make fewer mistakes when each team member understands their own roles and responsibilities.^[46-48] By using a daily goals form for ICU patient care, Pronovost^[49] found that when team members understood the goals better, ICU length of stay decreased from 2.2 days to 1.1 days. These findings were supported by Jain et al.^[50] who found that a multidisciplinary team involvement in daily goal setting for ICU patient care, bed management, and best practice promotion reduced adverse events, and further reduced the cost and length of stay.

In a study examining causes of human errors in ICU, Donchin et al.^[51] suggested that the problems of communication between physicians and nurses could contribute to many dangerous human errors. The ICUs that encouraged open communication among team members and across teams were found to perform better in terms of patient length of stay.^[52] Nap^[53] found that improved communication and collaboration among ICU doctors and nurses through team training significantly decreased patient ICU mortality. Lack of communication^[40, 43] or too many unnecessary steps in handing off patients^[36] in ICU/HDU patient discharge were perceived as barriers to efficient discharge. However, others found that improved collaboration through improved teamwork was either not associated with outcome^[54] or the associations were not measured.^[55, 56]

Table 3: Teamwork Factors Influencing the ICU Discharge Process

Author (year) ^{ref.#} Country	Research Method and Instruments	Setting/Sample	Findings	Comment and Limitations
Donchin et al. (1995) ⁽⁵¹⁾ Israel	Concurrent incident study. Two types of data were collected over a 4-month period: 1) errors reported by physicians and nurses immediately after an error discovery; and 2) activity profiles based on 24-hour records taken by observers with human engineering experience on a sample of patients.	One medical-surgical ICU of a university hospital. Doctors and nurses who reported errors.	<ol style="list-style-type: none"> 1. A total of 554 human errors were reported by the doctors. 2. There was an average of 178 activities per patient per day and an estimated number of 1.7 errors per patient per day. For the ICU as a whole, a severe or potentially detrimental error occurred on average twice a day. 3. Physicians and nurses were about equal contributors to the number of errors, although nurses had many more activities per day. 	Dangerous human errors do occur in ICU and many of these are contributed to by communication problems between ICU physicians and nurses. Human factors research is needed to reduce the number of errors. Limitations: The setting was from one hospital that was very understaffed. This may affect the generalisation of this result to other hospitals that are better staffed. The presence of the observer may have influenced the incident report rate.
Jain et al. (2006) ⁽⁵⁰⁾ USA	Prospective interventional study. Interventions: Four changes in practice, culture, and communication were implemented. Measurements: Nosocomial infection rates; adverse events per ICU day; average LOS; and average cost per ICU episode. Data from 1 year before (2001-2002) and during the intervention (2002-2003) period.	28 bed Medical-Surgical ICU unit with 95% occupancy. Physicians, nurses, respiratory therapists were the participants for change in practice (intervention).	<ol style="list-style-type: none"> 1. Decline of infection rates and adverse events, reduced costs, and LOS after the intervention. 2. The team approach led to improved communication among physicians, nurses, respiratory therapists, pharmacist, dieticians, and others. 	Better communication provided ongoing interdisciplinary education of all team members, and it supported better coordination of care for patients and concurrent data feedback. Limitations: There were unmeasured confounding factors for this “before” and “after” comparison, such as other quality improvement programs in the hospital.
Lingard et al. (2004) ⁽⁵⁶⁾ Canada	Qualitative approach. Transcripts were analysed iteratively for recurrent themes by four researchers. Seven 1-hour focus groups were conducted with ICU team members. Interviews were audio-recorded, anonymous and transcribed.	Participants consisted of four nursing groups (n = 27), two resident groups (n = 6) and one intensivist group (n = 4) from 2 hospitals’ ICUs.	<ol style="list-style-type: none"> 1. Two mechanisms were recurrently described: the perception of “ownership” and the process of “trade”. 2. Analysis of these mechanisms revealed how power is commodified, possessed and exchanged as team members negotiate their daily needs and goals with one another. 	This research showed how health care professionals function on a team so as to meet both individual and collective goals. This indicates team training to achieve shared goals is needed to help team members to move beyond the current individual and collective goals. Limitations: Findings limited in 2 ICUs; outcomes were not measured.

Table 3: Teamwork Factors Influencing the ICU Discharge Process (continued)

Nap et al. (2000) ⁽⁵³⁾	Prospective, randomised, multi-centre and multinational study. Patient data were compared before and after the intervention. Interventions: 1) Training of nursing and medical staff of 25 ICUs in inter-professional collaboration. 2) The use of a specific manual of instructions, supported by the daily use of two protocols covering awareness of processes of care, and professional dialogue (6 months). Final outcome measurement: ICU mortality.	47 ICUs (22 control vs. 25 intervention group) from 9 European countries. All consecutive admissions were enrolled, during two periods of two months each.	A significant decrease in ICU mortality was observed for the intervention group (16% control group; 9% intervention group).	Collaborative practice and the use of protocols have a significant and beneficial effect upon clinical outcomes in the ICU. Limitations: Mortality as the only measurement can be biased by other influences if not risk adjusted.
Pronovost et al. (2003) ⁽⁴⁹⁾	Prospective cohort study. Main outcome variables were ICU LOS and percent of ICU residents and nurses who understood the goals of care for patients in the ICU 2 weeks before and 8 weeks post introducing daily goals form. Questionnaires for nurses and doctors with list of questions about how well they understood the patients' care.	Johns Hopkins Hospital (JHH) 16-bed surgical oncology ICU. All patients admitted to the ICU were eligible. All residents and nurses in the ICU.	1. At baseline, less than 10% of residents and nurses understood the goals of care for the day. 2. After implementing the daily goals form, more than 95% of nurses and residents understood the goals of care for the day. 3. After implementation of the daily goals form, ICU LOS decreased from a mean of 2.2 days to 1.1 days.	Shared goals and team members' understanding of goals can reduce the LOS and therefore optimise resource use. Limitations: Did not investigate how using the daily goals exercise reduced patients' LOS.
Zimmerman et al. (1993) ⁽⁵²⁾	Prospective multi-centre study. Interviews, direct observations. Demographic, physiological and outcome data for an average of 408 admissions per ICU. Questionnaires on ICU structure and organisation.	Nine ICUs: 5 teaching and 4 non-teaching. 3672 admissions; 316 nurses; 202 physicians.	Superior organisational practices among these ICUs were related to a patient-centred culture with strong medical and nursing leadership, effective communication and coordination, and open, collaborative approaches to solving problems and managing conflict.	"The best and worst organisation practices found in this study can be used by ICU leaders as a checklist for improving ICU management".
USA				

DISCUSSION

The ICU patient discharge process often starts from ICU admission when the planning of care is initiated, and does not conclude until the patients have been transferred out to wards, and the responsibility, accountability, and management of the patient has been completely handed over to the ward staff. This process can involve health professionals from many disciplines, including ICU specialist physicians and nurses, ward physicians and nurses, managers from different departments, ward clerks, and support systems such as pathology, radiology, etc. Many mini-processes are embedded within the ICU discharge process, such as the patient discharge decision-making process, preparation of patients for discharge from ICU, and handover processes.

Due to the complexity of the ICU discharge process, problems can occur at any stage. Discharge delay can result if no ward beds are available, no hospital support team is available to help with patient transfer, or the ICU nurse cannot get the patient ready due to staffing issues. Premature discharge may result from decision makers' poor knowledge and/or experience or pressure for beds from other departments. The patient's condition may deteriorate on the wards when the level of nursing care is less than required. Post-ICU discharge mortality can result from night time discharge,^[28] premature discharge,^[30] or from human errors.

Triage related to ICU discharge is used when the demand for ICU resources exceeds the supply. Prioritising and triaging methods can be applied by deciding which patient will benefit more from ICU services. The triage discharge model must be used with caution; while it can be a strategy to free up badly needed ICU beds,^[57] it can also lead to premature discharge, which has been found to be associated with increased mortality.^[8]

Some researchers have found an association between higher illness severity scores (e.g. APACHE II) and increased mortality in ICU discharged patients.^[18, 19] Some may argue that this may relate to the fact that some patients are discharged on palliative care, “Do Not Resuscitate” orders. However, Beck et al.^[30] argued that late discharge and high discharge TISS scores^[58] are significant indicators of premature discharge. Thus, an evidence-based discharge guideline is needed to safeguard the ICU patient discharge practice.

The ICS^[21] and SCCM^[20] guidelines share similar admission criteria and focus on patients’ clinical needs, and in particular, the need to support organ function, the diagnostic group, objective parameters and stability of physical condition. However, the SCCM guidelines provide much more detailed information regarding discharge than the ICS guidelines. Although the relationship between the use of guidelines and protocols and ICU patient outcome is still unclear, research suggests that the use of discharge guidelines and policies improves the utilisation and availability of ICU resources, and reduces ICU stay.^[23-25] Therefore, the use of guidelines and policies such as ICU patient discharge criteria may optimise patient flow and the performance of ICUs. In addition, the lack of agreement related to ICU discharge clinical decision making^[27] indicates a need for more research to clarify ICU discharge criteria.

Resource utilisation and availability were found to play a vital role in ICU patient discharge and outcome. Although abundant research has shown that after-hours discharge^[8, 28-31] and premature discharge^[8] are associated with increased mortality, these practices still exist. Discharging sicker patients after hours may indicate the pressure on ICU beds, and may be unavoidable due to resource constraints. However, systems and strategies, such as the outreach team,^[34, 37, 38] need to be put into place to make after-hours discharge safer. This further calls for the need to improve the flow and performance of ICUs, to optimise the utilisation of existing resources.

The availability of resources not only affects the number of patients a unit can admit, it may also influence the discharge decision-making process in ICU. Sprung et al.^[59] suggest that better management of ICU beds and more hospital beds can improve the decision-making process by helping the decision makers to focus on the patient's clinical condition rather than on the availability of hospital resources, further preventing ICU patients from being prematurely discharged. Understandably, ICU patient outflow can be influenced by a lack of resources in other parts of the hospital, including a lack of single rooms in the wards, lack of transport for the patient to go to another facility, or a lack of ward-based clinical decision-making due to a lack of medical cover on the wards, ward nurses skill mix and/or ward staffing levels.^[30, 60-62]

Efforts in analysing the ICU processes and improving performance have been shown to make a difference in patient outcome and/or organisational outcome.^[11, 34, 35] Organisational interventions related to ICU patient discharge, such as ICU liaison nurses^[11] and ICU outreach teams,^[34, 37, 38] appear to improve the flow and performance, and result in shortened hospital stay and decreased patient hospital mortality. However, the degree to which these services are available is not clear. These services may benefit more patients if integrated into the standard ICU structure.

Early discharge planning may help to improve the resource utilisation by more smoothly discharging patients home. Assessment of a patient's discharge needs in ICU will allow sufficient time to get problems sorted and equipment organised for the patient's timely discharge from hospital. However, research shows that many ICU nurses either do not think discharge planning happens in ICU^[63] or lack knowledge about discharge planning.^[41]

Research indicates that individual factors related to the multidisciplinary team can play a vital role in many stages of the ICU discharge process. Serious adverse events often involve an individual error together with a few system failures, such as work environment, organisational

levels, and teamwork.^[15] The lack of agreement in discharge decision making may indicate a problem in staff training, role clarification, or the use of discharge guidelines. At the same time, discharge planning in ICU needs to be promoted in clinical practice to ensure a faster and smoother hospital journey for patients. Nursing staff in ICU may need to be trained in patient discharge planning. Patients may be discharged sooner from hospital if discharge planning is initiated earlier. This, in turn, could free up the ward beds that often cause bed block.

Teamwork involves shared organisational goals and coordination of effort among team members and across teams. Team members must work in a coordinated manner to realise their shared goals. Communication within and across teams is often at the centre of ICU and hospital activity. Handover from ICU to ward is an important part of communication among team members to ensure continuity of safe patient care. Although handover is currently close to the top of the patient safety agenda^[64] and has been researched, to some extent, within the general hospital setting,^[65-67] limited research was found regarding the ICU medical and/or nursing handover undertaken when patients are discharged from ICU.

A team cannot realise its shared goals if the team members do not have teamwork skills. Baker et al.^[45] found that teamwork training improved the communication and collaboration in teams. However, healthcare workers are rarely trained to work as teams in current education systems,^[45] and empirical evidence on teamwork and team training in ICU patient discharge is rare. Additionally, while there has been increasing interest in individual factors and teamwork in healthcare research, few studies explore the multidisciplinary team's influence on the ICU patient discharge process, team training, collaboration and cooperation.

There are some limitations in the review. It excluded a well researched and reviewed aspect: patient factors that contribute to ICU patient discharge. These were excluded because of the

complexity of this aspect, and the aim of this review was to focus on areas that maybe amenable to change but are not as frequently considered.

RECOMMENDATIONS AND CONCLUSION

Intensive care patient discharge is influenced by organisational factors, individual factors and teamwork factors. Organisational interventions are effective in reducing ICU discharge delay and shortening patient hospital stay. However, from the current literature, gaps exist. In order to provide evidence for best clinical practice in critical care, more rigorous research is needed to discover how organisational factors, such as discharge guidelines and policies, individual factors, such as clinical decision making, and teamwork factors, such as patient handover, influence the ICU patient discharge process.

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