

Understanding the distributed cognitive processes of intensive care patient discharge

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Abstract

Aims and objectives. To better understand and identify vulnerabilities and risks in the ICU patient discharge process, which provides evidence for service improvement.

Background. Previous studies have identified that 'after hours' discharge and 'premature' discharge from ICU are associated with increased mortality. However, some of these studies have largely been retrospective reviews of various administrative databases, while others have focused on specific aspects of the process, which may miss crucial components of the discharge process.

Design. This is an ethnographic exploratory study.

Methods. Distributed cognition and activity theory were used as theoretical frameworks. Ethnographic data collection techniques including informal interviews, direct observations and collecting existing documents were used. A total of 56 one-to-one interviews were conducted with 46 participants; 28 discharges were observed; and numerous documents were collected during a five-month period. A triangulated technique was used in both data collection and data analysis to ensure the research rigour.

Results. Under the guidance of activity theory and distributed cognition theoretical frameworks, five themes emerged: hierarchical power and authority, competing priorities, ineffective communication, failing to enact the organisational processes and working collaboratively to optimise the discharge process. Issues with teamwork, cognitive processes and team members' interaction with cognitive artefacts influenced the discharge process.

Conclusion. Strategies to improve shared situational awareness are needed to improve teamwork, patient flow and resource efficiency. Tools need to be evaluated regularly to ensure their continuous usefulness.

Relevance to clinical practice. Health care professionals need to be aware of the impact of their competing priorities and ensure discharges occur in a timely manner. Activity theory and distributed cognition are useful theoretical frameworks to support healthcare organisational research.

Keywords: activity theory, cognitive artefacts, communication, discharge process, distributed cognition, intensive care, situational awareness, teamwork.

Introduction

Hospital systems are typical complex work systems (Galliers et al. 2007, Nemeth 2008). The success of a healthcare organisation relies on team members' clear understanding of their collective objectives, effective teamwork and optimal communication (Nemeth et al. 2003, Xiao 2005). The intensive care unit (ICU) patient discharge process, as part of a complex hospital system, can involve health professionals from various disciplines and departments such as ICU and ward physicians and nurses. 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 the clinical handovers. As a result of the complexity of the ICU discharge process, problems can occur at any time.

The ICU discharge as part of ICU's routine activity has been shown to be associated with poor patient outcomes and hospital performance (Chaboyer et al. 2006, Pilcher et al. 2007). Dimensions of the ICU discharge process, including discharge delays (Levin et al. 2003, Chaboyer et al. 2006), poor clinical handover between the ICU and the ward staff (Whittaker & Ball 2000, Haggstrom et al. 2009), and ward nurses' skill mix (Watts et al. 2005), have all been found to affect the discharge process. However, more research evidence is needed related to how the ICU discharge process is carried out, what factors influence the whole process and how the factors interact, so that greater efficiency can be achieved and patient flow through the hospital may be improved.

Theoretical framework

In this ethnographic study, we used distributed cognition and activity theory to gain an understanding of the discharge process. Distributed cognition is defined as a branch of the cognitive sciences that explores and analyses cognition in real-world settings (Hutchins 1995a,b, Star 1996, Decortis et al. 2000, Hutchins et al. 2001). A cognitive work system is composed of a collection of individuals, the artefacts (tools) they interact with and their relations to each other in a large work environment (Hutchins 1995b, Le Bot 2004). It proposes that cognitive properties are situated in system's activity processes rather than in the minds of the individuals (Hollan et al. 2000). Distributed cognition distinguishes itself from other approaches to analyse complex organisational work in terms of three distinctive principles: cognitive processes are distributed among individuals in the group; individuals interact in a meaningful context; and individuals interact with artefacts (Hollan et al. 2000).

For this reason, it is considered an ideal framework for exploring complex work systems in artefactual, social and cultural dimensions (Perry & John 2003).

Activity theory is a framework for studying and analysing human activity at the individual and social levels in the social development process using human activity as the unit of analysis (Engestrom 1987). Within activity theory, an activity is defined as a basic part of human behaviour that can be analysed within a meaningful context, and its purpose is to achieve the outcome for which the subject aimed. The latest generation of activity theory was illustrated as two interacting triangles. Each triangle consists of six aspects of human activity: subject, object, tools, rules, division of labour and community (Engestrom et al. 2006). Activity theory has been considered as a descriptive tool that enables researchers to understand details of a activity system at local level (Halverson 2001, Susi & Ziemke 2001). It has been accepted that strengths of activity theory in complex organisational research lie in its strong cultural and historical roots (Kajamaa 2012). Activity theory has been used to study complex healthcare work including transforming nursing home practices (Makitalo 2005) and hospital frontline work (Kajamaa 2011, 2012) but has not been used in ICU discharge research.

Distributed cognition and activity theory share a common interest: cognition in complex work systems. While they have been mostly used as standalone theoretical frameworks for understanding cognitive work settings (Nemeth et al. 2003, Barab et al. 2004, Cohen et al. 2006, Hazlehurst et al. 2007, Laxmisan et al. 2007, Zurita & Nussbaum 2007), there have been some studies that used the two theories together to study complex work systems (Jones & Nemeth 2005, Galliers et al. 2007). The use of the two theories in this current study of the ICU discharge process is complementary, which allows both a descriptive view of how the ICU patient discharge activity is carried out at the microlevel using activity theory and an analysis of organisational factors that influence the ICU discharge process at the more macrolevel using distributed cognition.

Methods

Ethnographic data collection techniques including direct observations, informal interviews and the collection of tools (artefacts) related to discharge were used in this research.

Sample

This study was conducted in a 580-bed Australian tertiary teaching hospital, which has a 14-bed level-three ICU. There are approximately 1,500 intensive care admissions a year with an average patient length of stay (LOS) of 3.2 days. Data were collected on a total of 17 days in the ICU and on the wards that received patients from the ICU during a five-month period from April–September 2007. A total of 28 discharge processes were observed.

Participants

ICU and ward staff members who were involved in the discharge process were invited to participate. The medical and nursing staff in ICU were interviewed after the patients were discharged to the wards. Ward staff members who were in charge of bed allocations were interviewed after they had allocated the ICU patients a ward bed. Ward nurses were interviewed after they have taken over the care of the patients from ICU staff. Other staff members, involved in the ICU discharge but not directly related to the care of the patients, including hospital bed managers and ward clerks, were interviewed at a time convenient for them. All interviews were audio-recorded and later transcribed verbatim. A total of 56 interviews were conducted with 46 participants. Some staff members were interviewed more than once because they were involved in more than one discharge process. Table 1 presents a summary of participants and their interview status. One participant declined to participate.

There were small numbers of participants in some staff categories who could be easily identifiable by people working in the organisation; for example, there was only one ICU manager. Therefore, in the findings and discussions, the nurse in charge, nurse educators and unit managers were grouped as clinical nursing leaders, while the nurses worked at the bedside were grouped as bedside nurses.

Data collection

Each discharge process was observed from the morning, when the preliminary discharge decision was made, to when the patient was transferred to the ward. All discharge activities related to the observed cases, including discharge decision-making, bed allocation, patient preparation and handovers, were observed and documented. Field notes and data collection summaries of the observations were taken every day during data collection. Numerous tools including blank and de-identified documents used by staff to manage patient discharge, for example, ICU discharge summary, were collected. Data analysis occurred both during and

after data collection, which is one of the characteristics of qualitative study. Each day's data analysis would inform the next. We concluded the data collection when ongoing data analysis indicated that the data collected were rich enough to reveal the patterns of the ICU patient discharge process.

Data analysis

This study used a two-phased inductive data analysis approach, which consisted of first coding for categories and subthemes under the activity theory framework (phase one) then linking the subthemes under the distributed cognition framework (phase two) (Bryman & Burgess 1994). In phase one, from reading and rereading all field notes, contact summaries and transcribed interviews, initial codes and preliminary categories were developed, and subthemes were revealed under the activity theory framework. The result of this step was a detailed description of the discharge process. In phase two, by looking across the subthemes from the phase one, under the distributed cognition framework, the final themes were generalised.

From all data including field notes, interviews, collected documents and case summaries, phase one data analysis identified three main interacting activity systems in the ICU patient discharge process: the ICU discharge activity which involved discharge decision-making and preparing the patient for discharge; the ward accepting the ICU patient activity which involved bed and staff allocations, patient rooms preparation and accepting patients from ICU and hospital bed management activity which involved negotiating bed allocation with the wards and balancing bed demands within the hospital. Within each activity, the subjects, their objects, the tools they used in the discharge process, the rules, guidelines, routines they followed, how each professional group worked with other members of the hospital community and how discharge tasks were divided were identified. Further analysis, under the distributed cognition framework, revealed five themes: hierarchical power and authority, competing priorities, ineffective communication, failing to enact the organisational processes and working collaboratively to improve discharge processes. This article reports and discusses the final themes.

Table 1 Staff participants and interview frequency

Classification	Number of staff consented	Percentage of total consented	Number of staff interviewed	Number of staff interviewed more than once
ICU registered nurses (RN)	52	61.2	18	9
Ward RN	13	15.3	13	1
ICU medical staff (physicians, registrars, residents, interns)	16	18.8	11	0
Ward medical staff	2	2.4	2	0
ICU ward clerk	1	1.2	1	0
Bed manager	1	1.2	1	0
Total	85	100.0	46 (54%)	10 (12%)

Research rigour

Credibility, fittingness, auditability and confirmability are essential aspects to evaluate the rigour of a qualitative study (Lincoln & Guba 1985, Sandelowski 1986). In this study, credibility was achieved by persistent observations, rigorous data analysis processes and data triangulation. The observations started each morning at 7 AM before the preliminary discharge decisions were made and ended when patients were discharged to the wards. Ongoing data analysis during data collection ensured the completeness of the data collected. Data triangulation techniques, for example, comparing data collected from various sources and from different participants, were used to increase the research rigour. The findings of this study may be generalised to hospitals that have similar characteristics to the study hospital, which shows the fittingness of this study. Auditability was achieved by a clear documentation of the decision trail during research planning, data collection and data analysis. Once

credibility, fittingness and auditability are established, confirmability is achieved (Lincoln & Guba 1985, Sandelowski 1986, Guba & Lincoln 1994).

Ethical considerations

This research was approved by the ethics committees of the hospital and the university involved in the study. Because only the discharge process and staff were observed, patient consent was waived, but when observations took place at the bedside, verbal consent from patient was obtained.

Results

Hierarchical power and authority

Data showed that staff in higher positions seemed to have more power and influence in the discharge process, including discharge decision-making and discharge practices, as these participants stated:

... the morning medical handover ... the consultants ... some like it short and brief, some like it more in detail. As Registrars we must consider who we are reporting to.
(Participant # 3, ICU registrar)

I don't ever challenge the consultants' decision to discharge a patient from ICU.
(Participant # 34, ICU registrar)

Further, the influence of hierarchical order across disciplines, such as between nursing clinical leaders and junior medical staff, was also evident, as this interview shows:

Well we haven't raised the issue [a ward Nursing Clinical Leader's preference of not joining the medical ward rounds] with them ... but sometimes I don't have time to go and hunt down one person [nurse] to tell them what we're doing and if things [medical orders] have been followed up. (Participant # 1, ward resident)

Competing priorities

Observations showed that competing priorities influenced the discharge process. ICU physicians and nurses often faced competing demands for ICU beds, which explained why ICU staff were proactive and aimed to discharge patients as soon as possible.

Ward physicians often faced competing demands of attending clinics, ward rounds and other tasks, which prevented them from completing ward discharge processes in a timely manner. This consequently influenced ward bed availability. As this ward nursing clinical leader stated:

Then one particular team has been in clinic all morning, so we are waiting for that team. They have got about ten patients here to review and may discharge a few, and do some scripts, and sort of follow up the rest of their process. They have got clinic ... they can't cancel clinic to sit here and write scripts. It's hard for them. But it's frustrating for us. (Participant # 77, ward clinical nursing leader, on case 27)

Ward clinical nursing leaders faced competing priorities when allocating beds to patients being discharged from ICU. Observations showed that when allocating beds, the focus of ward clinical nursing leaders was on ensuring that their wards functioned optimally in relation to their staffing

levels, staff skill mix, staff workload and the needs of other patients. The ICU team's request for a ward bed was often weighted against these factors and was not always given priority.

Ineffective communication

The observations, interviews and collected documents showed that communication was ineffective in the discharge process. First, information loss in ICU to ward nursing handover was obvious when the information given by the ICU nurses and the information received by the ward nurses were compared. The lack of documentation for the verbal handovers on the wards was one of the reasons of the information loss, as the following case summary showed:

This ICU nurse gave a patient handover to the ward nurse in charge by phone. But this ward nurse in charge did not pass that information onto the nurse who was looking after this patient, because she had already gone home by the time the patient arrived on the ward. (Case 14 summary)

Second, ward nurses rarely referred to the ICU nursing discharge summary. This appear to be related to its design issues, different understandings of what information should be included in the ICU nursing discharge summaries and the lack of tool evaluation and improvement over time. In contrast, on a small number of wards, which had a standardised form to document ICU nursing handovers, the information was transferred better than the wards without such documentation. The form used by ward staff to document phone handover

facilitated the handover not just by documenting the handover information; it also provided the ward nurses with a guide, which prompted them to ask questions during handovers.

Third, communication across departments was found to be ineffective. There was no process for staff from different departments to share their decision-making processes and ask questions. For example, the bed managers often communicated with other bed management team members, such as the department directors and bed managers from other facilities, to source all possible beds. However, this effort was not seen by other staff. The urgency of vacating ICU beds was often not communicated between ICU and ward nurses.

Lastly, there was ineffective communication between nursing and medical teams within departments. In ICU, nurses did not routinely update the ICU physicians on their patients' discharge progress. On one ward, nurses did not join the physicians during morning ward rounds. These nurses had to read the patient charts to find out what needed to be carried out before patients were discharged, as this interview shows:

I've written down in the chart plan to do so and so urgently. But if the nurses don't go back and have a look at the plan, they wouldn't know what to do. A lot of time it's a bit hard for us because the consultants are rushing ward rounds and we've got things that need to be done, and we need to tell the nurses but they're not there. (Participant # 1, ward resident)

Failing to enact the organisational processes

This theme illustrates how hospital patient data and bed management computer programs were not used effectively. Because ward staff often did not update the computer system with patient discharge information and failed to comply with a trial of bed management software, the hospital bed managers had to talk to clinical nursing leaders to determine where empty beds existed. This manual management process was observed to be inefficient and nontransparent and, in some cases, contributed to discharge delays and communication breakdowns.

Working collaboratively to optimise the discharge process

In contrast to the issues described above, some staff members worked beyond team and departmental boundaries to optimise discharge and ensure patient safety. Some of the teams had strategies in place to communicate and collaborate among teams and across departments, as stated by this ICU participant:

I would speak to the Registrar that's on the ward personally. And I would say 'this patient is coming to the ward, we would have liked to hang on to them for another six hours or so but we do need the bed ...' then give them very clear instructions. I would go up and see the patient say a couple of hours after their discharge, and see how they're doing. (Participant # 83, ICU registrar)

In addition, on some wards, nursing and medical teams worked in a coordinated way to plan their patients' care. For example, on one ward, clinical nursing leaders and physicians held regular meetings to discuss bed demands and patient management plans. Because the physicians often reviewed their patients regularly when the patients were in ICU, they could predict when the patients may return to their wards, and this prediction was communicated back to the nursing team at these meetings. When patients were discharged to these wards, it was evident that the process was much smoother than in the wards that did not hold these meetings.

Finally, supporting inexperienced team members seemed to optimise the discharge process. ICU liaison nurse supported ward nurses on occasions. The role of ICU liaison nurse was to follow up the discharged ICU patients on the wards during the hours of 7 AM–3.30 PM. But on occasions, the ICU liaison nurses provided ad hoc training to ward nurses, so a timely ICU discharge could occur. As verified by this ICU nurse:

They'll [ward nurses] just get the handover [from ICU] and they go 'wow you know our skill mix is this ... we can't accept this patient'. So the ICU Liaison Nurse would go up and talk them through it a little bit. If they've got any bits and pieces they haven't seen for a while, whether it be treatment regimes, devices ... (Participant # 4, ICU clinical nursing leader)

Discussion

In distributed cognition framework, the unit of analysis is the cognitive activity system, which consists of three dimensions: cognition distributed among a collection of individuals, the relationships among the individuals (teamwork) and the artefacts (tools) with which they interact with (Hutchins 1995a).

Shared situational awareness

Distributed cognition emphasises the fact that cognitive processes are distributed among team members (Hutchins 1995a, Hollan et al. 2000). The findings of this research support the contention that the ICU patient discharge process was a complex distributed cognitive process that involved many individuals in multidisciplinary teams including physicians, nurses, hospital managers and clerical and support workers from various departments. Large hospitals are dynamic work systems that are constantly changing. To fulfil his or her roles and responsibilities in such a dynamic system, each team member needs to constantly collect information from the discharge environment that was relevant to their objective and assess the situation accurately using available information. This accurate assessment helps the team members to make appropriate decisions. This process of collecting and comprehending dynamic information related to their work situation has been referred to as situational awareness (Endsley 1995, Flin et al. 2008, Wright & Endsley 2008). Situational awareness among team members must be optimised, so that the individuals who were involved in the discharge process could make appropriate decisions and take actions accordingly.

Wright and Endsley (2008) suggest that within a team, each member has his or her own unique situational awareness that is crucial to their subgoals and individual performance. Their subgoals must overlap with the team's goal, so the team could collectively achieve the desired outcome. Shared situational awareness among team members is important for optimal team outcome. Themes including ineffective communication, competing priorities and failing to enact organisational processes revealed that lack of regular communication among staff from different departments, poor quality handovers and the lack of up to date patient flow information on the hospital computer system contributed to the suboptimal shared situational awareness among team members, which consequently impeded the discharge process. In contrast, as shown in working collaboratively to optimise the discharge process, regular team meetings among members optimised shared situational awareness, which enabled the team to manage patient flow within the hospital more efficiently.

Teamwork

Another dimension of distributed cognition is teamwork, which emphasises that individuals need to interact with each other in the cognitive system to achieve the collective objective (Hollan et al. 2000, Hutchins et al. 2001). Worldwide theoretical and empirical literature suggests that leadership, team structure, communication and coordination influence team

performance in large healthcare organisations (Salas & Cannon-Bowers 2000, Flin et al. 2008, Xyrichis & Lowton 2008, Lin et al. 2009).

The findings of this study support the contention that healthcare organisations are often hierarchical, with staff in senior positions often having higher status and more power than all other staff (Islam & Zyphur 2005, Brand 2006, Reader et al. 2007), and junior staff were often reluctant to speak up when they disagreed from senior staff (Edmondson 2003, Islam & Zyphur 2005, Brand 2006, Mills et al. 2008). Hierarchical authority can be beneficial for an organisation because when leadership is accepted, the team stays united to achieve the shared goals (Manion et al. 1996). However, the hierarchical order could adversely impact on team performance if staff members in lower ranks are reluctant to disagree or to voice a different viewpoint from staff in higher positions (Manion et al. 1996). In the discharge process, ward junior medical staff did not speak up when they disagreed with the decisions made by some senior staff to omit multidisciplinary morning rounds.

In addition, the ICU morning handover lacked consistency because the reporting registrars were concerned about the ICU consultants' preferences on the length of the morning handovers. Adverse events may occur post ICU discharge when staff members fail to speak up in front of senior staff in the discharge process. These issues could have an impact on the discharge efficiency and patient safety if vital information is not shared in a timely manner.

Communication and coordination between teams from ICU and the wards have been found to be inadequate in ICUs in many countries. In a Greek study, less than 50% staff from other departments perceived coordination and communication with ICU staff as adequate (Kydonia et al. 2010). In a Swedish study, ICU and ward nurses from three ICUs perceived that the ICU patients could be discharged more smoothly when doctors and nurses worked collaboratively between ICU and the wards and also with better communication (Hägström et al. 2009). This study supports the above findings. The lack of communication across departments and different teams' competing priorities contributed to ward discharge delays, which subsequently contributed to ICU discharge delays.

Apart from the influence of hierarchical order, a lack of interdisciplinary communication among physicians and nurses in clinical settings (Donchin et al. 1995, Alvarez & Coiera 2006, Nadzam 2009) and the frequency of communication have been identified as barriers to teamwork between physicians and nurses (The Joint Commission 2007, Nadzam 2009). In addition, inadequate communication between ICU physicians and nurses has been found to

be associated with increased errors (Jain et al. 2006). In this study, the lack of communication between ICU nurses and physicians, and between some ward physicians and nurses, could pose a potential risk to patient safety and/or reduce the efficiency of hospital service delivery if either party was not aware of changes in patients' clinical condition or vital information was not communicated promptly.

In contrast to the problems and issues discussed above, the theme working collaboratively to optimise the discharge process described how effective communication and coordination within and across a small number of departments optimised the discharge process. Flin et al. (2008) indicate that team coordination can influence team performance. Team coordination can be improved by strategies such as effective communication and observing other team members' workload and performance. In this research, regular meetings among nurses and physicians on one specialty ward enabled them to communicate effectively to coordinate their activities and plan for admitting the ICU patients into their wards. This supports the findings of a study conducted in the USA where coordinated teamwork and open communication among team members were the major factors contributing to better patient care (Shortell et al. 1994). Similarly, Jain et al. (2006) found that daily flow meetings attended by all unit managers supported better coordinated care, which may have shortened ICU LOS and reduced costs.

In addition, in this research, the culture of supporting others contributed to better coordinated teamwork. This is consistent with recommendations from the literature that the culture of supporting others, as an element of team structure, influences team communication and coordination, which is essential for effective teamwork and optimal teamwork performance (Flin et al. 2008).

Cognitive artefacts

Another focus of distributed cognition is how humans interact with artefacts in the cognitive activity system (Hutchins et al. 2001). Cognitive artefacts are designed for humans to use and to share information in order to achieve coordinated teamwork in large organisations (Nemeth et al. 2006). The findings of this study support the notion that cognitive artefacts play a crucial role in teamwork coordination and in building shared situational awareness.

Cognitive artefacts such as ICU discharge summaries and hospital bed management computer programs should act as common reference points and coordinated the communication among

multidisciplinary teams and provide a quick information access point and the basis for information transfer between departments in the discharge process. As suggested by Nemeth et al. (2006), the team members' interaction with artefacts, for example, putting daily patient data into patient information computer systems, can reduce uncertainty, build shared situational awareness and enable other team members to predict and plan for future patient care. Further, because hospital work processes are often dynamic, as a result of changing patient conditions, changing demands for clinical resources and the individuals involved in the patient care being highly mobile, cognitive artefacts function as common reference points for the professionals to access information and coordinate patient care (Nemeth et al. 2004, Wilson et al. 2007, Gurses et al. 2009).

The use of cognitive artefacts could prompt the users to check the status of the discharge process and to carry out discharge activities properly. A study conducted in a British ICU found that updating an ICU medical handover sheet prompted the physicians to do a systems check on the patient's condition (Wilson et al. 2007). A study conducted in an Australian hospital reported that the use of handover prompt cards and reporting templates, designed according to the SBAR (Situation, Background, Assessment, Recommendation)

system (Haig et al. 2006, Clark et al. 2009), improved nursing handover, with more nurses claiming that they always received the information they needed and more feeling confident in giving handover. In this study, the use of a handover form by some ward nurses ensured the ICU to ward phone handover contained a minimum dataset and provided a structure for the handover. It also helped junior staff to ask questions during handover. Thus, cognitive artefacts play an essential role in ensuring patient safety in the discharge process.

However, this study found that some cognitive artefacts, including the ICU discharge summary and hospital bed management computer programs, were not being used effectively. A tool's usefulness to each of the users is important to ensure optimal communication across teams. The interactions between the user and the cognitive artefacts also demonstrate the value of the artefacts (Nemeth et al. 2004). In this study, observations revealed that the lack of regular evaluation and improvement of these cognitive tools may have been a contributor to the ineffective use of some tools. Hutchins et al. (2001) suggest that cognitive processes are distributed through time where earlier events transform later events. Thus, how staff members interact with discharge artefacts may have a flow-on effect in the distributed cognitive system, which may in turn influence the overall outcomes. As suggested by Wilson et al. (2007), if any problems were identified while the cognitive artefacts were tested in real-

life situations, improvement measures should be undertaken. The lack of evaluation and lack of all user involvement in evaluation led to a failure to identify the problems. Consequently, some cognitive artefacts were continuously being used in a dysfunctional way, which did not support clinical communication and work processes as much as expected. Given the significant role cognitive artefacts play in supporting communication and coordination in the discharge process, these problems may contribute to poor communication, suboptimal discharge efficiency and patient outcomes.

Theoretical contributions

Activity theory and distributed cognition study social transformation at different levels, which may provide a deeper understanding of how the discharge process occurs than using either theory alone. Hung et al. (2006) argued that in an activity system, social transformations take place on two distinctive levels: in context and in process. They suggested that context transformation refers to the macrolevel developmental nature of the community, which evolves over time and place, while process transformation refers to the developing nature of actions and cognition at the microlevel. Therefore, as suggested by Halverson (2001), activity theory can provide a clearer conceptual framework for categorising and analysing how local-level (microlevel) activity systems develop and transform, while distributed cognition offers flexibility in understanding how the bigger social cognitive structure (macrolevel) evolves and transforms.

Conclusion and relevance to clinical practice

This study found that strategies to optimise shared situational awareness among staff in the ICU patient discharge process are crucial in ensuring effective teamwork, increased resource efficiency and patient flow. The effective use of cognitive aids such as patient information systems to communicate patient movement information is important. Assessing and evaluating tools regularly is needed to ensure tool effectiveness. Activity theory and distributed cognition are useful theoretical frameworks to study complex healthcare work such as intensive care processes.

Contributions

Study design: FL, WC, MW; data collection and analysis: FL, WC, MW and manuscript preparation: FL, WC, MW.

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