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Exploring Information Sharing Problems in Nursing Handover: An Activity Theory Perspective

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Abstract

The sharing of patient handover information between individuals and teams of nurses in clinical settings is a complex process that requires consolidation and integration of information from different information sources and types of artefacts. The aim of this study is to identify the most critical information-sharing problems nurses experience during handover. Handover information-sharing problems are explored using Activity Theory (Engestrom, 1987) as a lens to better understand the nature of these problems. A qualitative research approach was conducted to collect data from four units in a large Saudi Arabian hospital. Findings indicate that Activity Theory is a comprehensive useful theory to analyse a full spectrum of socio-technical handover problems. The study Findings indicate that handover information sharing problems relate mostly to: 1) incompatible handover artefacts, 2) inadequate guidelines and training to conduct handover processes, 3) insufficient and fragmented documented information to share during handover and 4) nurses' personal style.

Keywords

Activity Theory, handover, nursing, information sharing.

INTRODUCTION

Effective and efficient clinical handover of patient information is recognised as crucial for the delivery of safe high quality healthcare (Association 2004). Clinical handover is defined as “*the transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis*” (Association 2004). Despite advances in medical systems, structures and technology use, information sharing during nursing handover is still problematic (McCann 2007; Meißner 2007). Limited studies have been conducted to investigate the problems of information sharing during handover (Bii and Olike 2004; Dracup 2008; Kaane 1995; Staggers 2012). The majority of research on handover focus on the mode of handover delivery rather than the nuances of communication to share information and the social dynamics that are integral for information sharing in the workplace (Benner 2004; Dracup 2008; Kerr 2002; Sexton 2004). There is also limited evidence of best practices, mechanisms (Riesenberg 2010) and frameworks for enhancing understanding, improving or evaluating handover (Jorm et al. 2009), while there are minimal guidelines to facilitate effective handover information sharing practices (ALTurki and Bosua 2011).

Additionally, Information Technology (IT) has been recommended as one way in which clinical handover information sharing can be improved (Petersen 1994). Prior studies suggest that IT can play a key role in shaping communication in healthcare processes (e.g. increasing information access, improving information delivery, updating and evaluating of information) (Toussaint and Coiera 2005). However, further investigation is needed to identify specific ways in which IT can support information sharing during handover (McCann 2007).

This study explores information sharing of nursing handover as an activity embedded in a particular social and organisational context. Taking this broader perspective provides an opportunity to identify and describe organisational factors and behaviours that influence the quality of information shared during handover. Hence, this study applies a socio-technical theory, Activity Theory (AT), as a lens to study clinical handover taking social and organisational contexts into account. The research question for this study is: *What are key information sharing problems that nurses experience during shift handover?*

The next section provides a brief theoretical background on clinical handover and introduces Activity Theory as a lens to study handover. Thereafter, the research method used for data collection and data analysis is described. Next, findings of the case study are presented. The paper concludes with a discussion, and highlights limitations and recommendations for further work.

LITERATURE REVIEW

Information sharing during nursing shift handover is a complex process that concerns two phases: a preparatory process followed by the sharing of the most essential information in the form of verbally reporting during a handover meeting (Engesmo and Tjora 2006). The preparatory process requires nurses to consolidate and integrate documented information from many sources and include essential patient care information such as diagnoses, current treatment regimens, relevant laboratory and diagnostic tests (Priest and Holmberg 2000). This information is typically held in patient records that include both paper-based patient records and Electronic Patient Records (EPR) (Berg 1999).

Handover has been identified as one of the key risks to patient safety (Cohen 2010; Johnson 2009; Roughton 1996). This can be directly attributed to the information being shared between individuals and teams of nurses across shifts. Failure to share the right information can lead to problems such as delays in treatment (Solet 2005), medication errors (Petersen 1994), unnecessary duplication of assessments (Bomba and Bomba 2005), and poor patient experiences (Kohn 2000). Studies on handover suggest that handover is frequently resulting in overlooking important information due to poor structure and process (Bomba and Bomba 2005). Many studies conclude that handover has not yet fulfilled its primary role as a communication tool to share information (Baldwin 1994) and that current methods used in conducting handover is not effective enough to ensure high quality communication (Johnson 2009).

Currently, there is no clear agreement about the type of information that should be shared during handover. As a result, most of the information shared during handover may be irrelevant to direct patient care, repetitive or speculative (Lyhne et al. 2012; McKenna 1997; Miller 1998; Sexton 2004; Watters et al. 2004). Other studies have concluded that verbal reporting during handover meetings are retrospective and task-orientated; focusing on actions already carried out and medical treatments patients received (Sexton 2004; Skehan et al. 1990). Furthermore, literature indicates that documents required for handover (e.g. nursing notes) are often not updated regularly and might therefore be inadequate (Allen 1998; Hopkinson 2002; Payne 2000). Missing or incomplete information during handover is often regarded as one of the most common causes for error. When a current clinical condition of a patient is incomplete, it is difficult for nurses to prioritize care, identify clinical deterioration (Horwitz 2008) or recognize and prevent patient complications (Anthony and Preuss 2002).

An IT intervention that has been popularly used during handover is EPRs. It is expected that by using an EPR during handover, communication between nurses will improve and verbal handover becomes more redundant (Hayrinen and Saranto 2005). Positive effects have been reported when using EPRs to assist information sharing during handover (Hertzum 2008). For example, some findings suggest that nurses experienced improved nursing plans, lower incidences of missing information and fewer messages to pass on between each other. However, some studies suggest that EPRs have not yet met all handover information needs such as information on future tasks, anticipated events and care plans (Perez et al. 2010; Staggers et al. 2011; Van Eaton 2004).

THEORETICAL BACKGROUND

There are a number of theories that could potentially be used in this study including Actor Network Theory (Latour 1999), Distributed Cognition Theory (Hutchins and Lintern 1995), Structuration Theory (Giddens 1984), Social Network Theory (Milgram 1967) and Activity Theory (Engeström 1999). Having considered these theories the Activity Theory (AT) is chosen as the most appropriate theory to investigate problems experienced by nurses at handovers as it allows for a deeper analysis of actions and activities performed by nurses and investigates detailed aspects of handover. Due to the large scope of AT and space limitations of this paper, the description of AT is limited and focuses merely on its key aspects that are relevant to this study. AT spans cognitive, developmental and cultural psychology, and focuses on how interactions in the world affect individual, social and cultural development (Baecker 1993). AT is often chosen as the underlying theory to study work practices and routines (Nardi 1996), which makes it useful to study handover as a routine activity performed at least twice daily on a regular base in clinical settings.

Most human activities are highly collaborative in the sense that different actions of an activity are distributed between several actors within a work practice, who in turn need to integrate results of these actions to achieve the objective of work. AT focuses on developmental transformations and dynamics of collective human work activity mediated by artefacts, including computer-based artefacts (Nardi, 1996). AT provides appropriate conceptualizations suited for analysing cooperative work, its dynamic transformation, and the importance of cooperative breakdowns. This provides the basis for analysing complex socio-cultural, organisational, and societal settings (Engeström 1999; Kuutti and Arvonen 1992), e.g. handover activity within complex clinical settings.

Engeström's (1987) AT model represented in Figure 1 shows that an activity has an active *subject* (actor), who understands the motive of the activity and can be an individual or collective (e.g. a team). An activity has an

object. The transformation of the object towards some desired state or direction motivates the existence of the activity. *Artefacts* mediate the subject and the object of activity. Artefacts have been adopted and developed in ways so that they can mediate certain activities. A third main component, namely *community* (those who share the same object of activity) also mediates the relationship between the subject and object, forming two relationships: a subject-community relationship and a community-object relationship. The relationship between subject and community is mediated by *rules*, and the relationship between object and community is mediated by the *division of labour* (Bryant et al. 2005). Considering the constructs of AT as a lens to deeper explain handover information sharing, the various AT constructs were interpreted and used as follows (ref Figure 1): the *subject* is the primary nurse or team of primary nurses, the *object* is a patient (with certain information that relates to his/her medical condition), *instruments* are handover tools (verbal communication, digital systems and manual documents), *community* include other healthcare professionals, rules are the handover mode, hospital rules and unit rules and *division of labour* is the nursing hierarchy that includes roles and responsibilities. The next section describes the research methodology used to identify handover-specific problems, guided by the AT as a study framework.

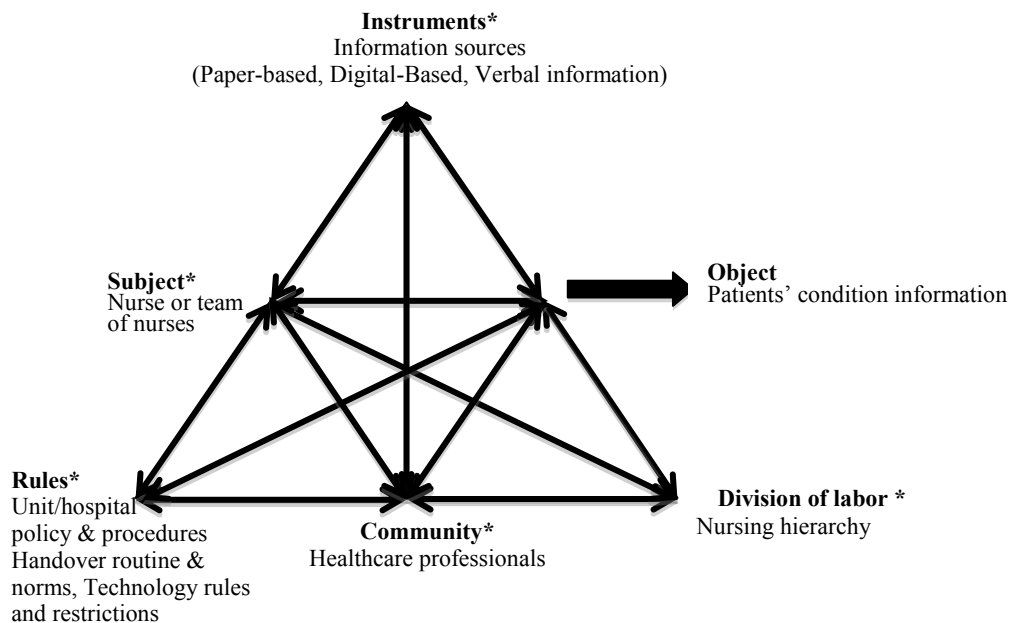


Figure 1: Socio-technical elements related to handover [*represents key AT constructs Engestrom's (1987)].

RESEARCH METHODOLOGY

For this exploratory study, a qualitative case study research approach was chosen. The case study strategy is particularly useful for collecting rich data and studying practice-based problems where actors experiences are important and the context of action is critical to analyze existing real-life situations (Lee 1989). Data collection methods for this study involved interviews, handover participant observations, and analyses of key organisational documents, records and other tools used to conduct and facilitate handover.

This single case study forms part of a larger research project that compares 3 different hospitals settings and contexts to investigate issues and ways to improve information sharing during handover across different settings. Due to the scope of the study, this paper only reports on the first set of data collected from 4 units in one of the hospital that participated in the study. This case study was conducted from January to March 2013 in a large public hospital located in Riyadh, Saudi Arabia. Established in 1978, this hospital has a capacity of 1,192 beds. Handover was studied in 4 different units: the Intensive Care Unit (ICU), the Emergency Room (ER), the Surgical unit, and the Obstetrics and Gynaecology unit (OB&GYNE). Units were carefully chosen to examine information sharing differences and similarities during handover activity, across the four units. One of the units (ICU) has fully automated patient records while the other three units each differs in terms of handover tools used and processes followed. It was envisaged that the choice of units would allow for a meaningful comparison. Twenty-six nurses were interviewed across all units, with each interview lasting approximately forty-five minutes. Table 1 summarizes key aspects of this case. Interviews were audio-recorded, while detailed scenarios were written to describe and summarize current work practices observed. A thematic data analysis was followed using AT constructs to categorize transcribed data into key themes in line with coding suggestions by (Miles and Huberman 1994).

Table 1: Case study details across the four units that participated in the study

Unit & no of participants interviewed	Nurse ratio and handover mode	Roles interviewed	Aspects explored about information sharing during handover	
Surgical (8)	5-7 patients per nurse Team handover	Head nurse, Clinical Resource Nurse (CRN) and charge nurse	Interviews	Observations
OB & GYNE (6)	4-6 patients per nurse One on one and team handover		<ul style="list-style-type: none"> • Problems • Tools used • Communication hierarchy • Handover mode 	<ul style="list-style-type: none"> • Handover tools used • Handover meetings
ER (7)	4-6 patients per nurse One on one handover			
ICU (5)	One patient per nurse One on one handover			

FINDINGS

Across all units there were 12 hours day and night shifts with morning shifts starting at 7am and night shifts at 7pm. An organization-wide EPR was implemented and used to store information that included personal patient information such as name, Date of Birth, gender, medical history, radiology examinations and blood results. A fully automated EPR (called IntelliVue Clinical Information Portfolio ICIP) was implemented and used since 2010 in ICU. A Computer On Wheels (COWs) available in front of each patient's room was used to access ICIP. ICIP contained *all* of a patient's clinical information and its use allowed ICU to abandon all paper-based forms that held information, allowing ICU to become fully paperless over time. The other three units (Surgical, ER and OB&GYN) relied mainly on paper-based artefacts for handover. In every unit, a handover meeting concluded each shift, requiring verbal sharing of patients' information between outgoing and incoming nurses. Units had varied handover methods that ranged in terms of handover modes, artefacts used and locations where handovers were held.

For the data analysis AT constructs and their relationships were used to guide the identification of themes. *Four* key information sharing problem categories were identified as discussed below: 1) subject (nurse) information sharing activities, 2) problems related to the mediating effect of instrument on the subject – object relationship, 3) problems related to the mediating effect of division of labour on the object – community information-sharing relationship and 4) problems related to the mediating effect of rules on the subject – community information-sharing relationship.

1) Problems Related to a Subject's (Nurse) Information Sharing Activities

Four verbal style-related information sharing problems were identified that impacted on handover:

-Rushed information-sharing style: Outgoing nurses were often rushed thus patient information was shared at a high speed resulting in inadequate information communication with some overlooked/forgotten information. A surgical nurse claimed that *"Nurses rush through handover and because of that they miss some important information."* An ER nurse confirmed *"During handover the outgoing nurse is tired so she will hand over as fast as she can to leave the hospital as soon as possible."*

- Language barriers: All communications were required to be performed in English. However, nurses came from different countries and for most English was not their first language, some having strong accents while others' had poor English. Thus in some cases nurse could not fully interpret what was being conveyed while some nurses ignored the English-speaking rule and shared information using their first language to nurses that spoke the same language, as one ICU nurse commented: *"If a nurse has a strong accent or weak English s/he wont deliver the proper information and misunderstanding can happen/sometimes they talk in their own language which is not allowed here"*, and another OB&GYN nurse confirmed: *"Some staff don't comprehend other's English, so some things [information] are misunderstood."*

-Verbal sharing of unnecessary content: Nurses complained that handover time was wasted by sharing unnecessary and irrelevant patient information e.g. previous treatments received by a patient, as a Surgical nurse explained: *"During handover we keep repeating the history of the patient and all the previous treatments that the patient received."*

- No double-checking of verbal information in patients' files: Furthermore, incoming nurses often do not double-check verbal information with documented information. Hence, verbal handover information often guided patient care without accessing documents in patient files to get the bigger picture, as one ER nurse claimed: *"The outgoing nurse sometimes omits some important information like a scan that needs to be done. Then there will*

be delays in the patient care because the incoming nurse did not read the patient file." A nurse from OB&GYN confirmed: *"Just like today, there was a missing information case that caused a big problem. This happened because the incoming nurse did not read the doctor's orders. Her excuse was that the outgoing nurse didn't tell her about it [doctor's orders]."*

2A) General Problems- Related to the Mediating Effect of Handover Instruments (Handover Artefacts) on the Subject – Object Relationship

- Non-standard use of hospital-wide handover artefacts: the format and use of verbal mediating information sharing artefacts varied across units. The *Surgical unit* experienced absence of a verbal mediating information-sharing artefact. Handover meetings were unstructured with no standard routine and nurses merely reading information from patient files while others used their own personal notes to hand over. Each nurse had his/her unique way of sharing information. The entire unit nurses claimed that missing information was common which impacted on handover quality as one nurse commented: *"There is always a case of missing information and it can be important information, in which case we must call back to the outgoing nurse to verify."*

An informal paper sheet called the 'endorsement sheet' formed the main verbal handover tool in the OB & GYN unit. The sheet with a table divided into three columns listed each room number (col.1), the mother's information (col. 2) and baby's information (col. 3). Shifts started with incoming nurses populating a copy of this sheet with information heard from outgoing nurses during the handover meeting. Nurses would then during the shift constantly update the sheet with new emerging information regarding a patient's condition. At the end of each shift the sheet is re-used to hand over to incoming nurses and destroyed thereafter. No guidelines on specific information to be included on this sheet were given which ended up in recording irrelevant handover information. The lack of guidelines and structure impacted on handover information sharing: *"The sequence and type of information shared depends on the nurse's special way. There is no guideline to follow."* (OB&GYN nurse).

In the ER a formal paper-based handover sheet divided into cells which nurses had to fill (titled the 'Kardex sheet'), was the main tool used to guide handover meetings. Handover information included a patient's name, vital signs, IV fluids and laboratory results. Kardex provided nurses with a structured information set which guided information sharing during handover as one ER nurse commented: *"During handover we don't have to think on which information to handover, everything we need to handover is on the Kardex."*

- Recording shift information using multiple forms during shifts: nurses were expected to fill too many different forms during each shift, sometimes using different pieces of paper. Information was thus scattered across a variety of paper sources which sometimes went missing as one OB&GYN nurse commented: *"sometimes papers are lost from the file or the whole file is missing, we cannot find it."* Another Surgical nurse commented: *"it takes us so much time to flip through all these different documents and find information we want to share at handover."*

- Recording of unnecessary information: Some nurses would document unnecessary patient information by writing long meaningless sentences. Also nurses would duplicate the same information but in different forms, as a Surgical nurse commented: *"Nurses would document in their notes 'vital signs taken' which is not necessary, because it is understood that you have done it from the vital signs sheet that you just filled."* an ICU nurse agreed: *"nurses think I will just type in as many notes as I can so others think that I am working hard. Many times what is typed is not useful because there is a lot of duplication and it is hard to read."*

-Downtime of key supportive handover tools: The EPR and ICIP were often down in which case nurses from the three units using the EPR had to make urgent calls to the lab and/or the radiology departments to get required results for handover, as a Surgical nurse claimed: *"When the computer [EPR] crashes it is a disaster, if it is an emergency, we have to call the laboratory and ask for the information."* Another ER nurse confirmed this dilemma: *"When the computer [EPR] goes down, we aren't able to gain lab results to hand over and this causes delays in treating patients."* This problem was more severe in ICU - ICIP downtime forced nurses to revert to old paper-based documents requiring later duplication through manual entry of the bulk of information into ICIP, as one nurse commented: *"Many times the system just shuts down, then unfortunately we have to go back to paper that is why we still keep our old forms. Once it [ICIP] gets back we [need to] type everything again."*

2B) Specific Problems – Related to the Mediating Effect of Instrument (Manual Artefacts) on the Subject – Object Relationship

In all units except ICU, documenting of information was performed manually (hand-written) using paper-based documents. The main documents that were important to handover included: individual nursing notes, doctor's orders and medication sheets. However, documenting of information caused a few problems:

-Illegible handwriting and use of illegal abbreviations: Participants complained that it was often hard to read other nurses' handwriting as one ER nurse claimed: *"Other nurses are complaining about my handwriting. I also sometimes find it hard to interpret the handwriting of others."* Additionally, a common problem found across all units was that documents contained illegal abbreviations not approved by the hospital, as the ICU head nurse stated: *"We have the problem of nurses typing abbreviations like 'VS' meaning vital signs but it can actually mean anything"* and a Surgical nurse agreed: *"nurses would come up with their own abbreviations. Once an outgoing nurse wrote '4u' of a certain medicine' meaning 4 units of medicine, which the incoming nurse read as 44 units of medicine."*

-Infrequent updating of manual handover documents: manual documents were not updated regularly and considered unreliable, as a Surgical nurse commented: *"There are cases when a patient received a medication but the nurse did not document that."* and *"Our Kardex is not always updated, like a scan that has been carried out but the nurse still has 'awaiting appointment' on Kardex, this wastes an incoming nurse's time."*

3) Problems Related to the Mediating Effect of Division Labour (Nurse Position Categories) on Object-Community Information-Sharing Relationship

A nursing hierarchy included community nurses involved in the primary nursing handover including other nurses that managed teams of community nurses i.e. clinical resource nurses (CRNs), and charge nurses. A charge nurse managed each unit while a CRN was responsible for at least two units. CRNs assisted in teaching new nurses the procedures, policies, and standards of the hospital including handover.

- Charge nurse/CRN absence impact on handover quality: Usually, both a unit's charge nurse and CRN would attend each morning's handover meeting. Both were responsible for supervising nurses' during handover and assisting with unusual cases by providing expert advice. They played key roles during handover to enhance understanding, learning occurs and handover is of high quality, as the ICU charge nurse explained: *"Sometimes there are doctor orders that a nurse will not understand. We must help them to understand and follow up if the care is applied or not"*. However, charge nurses and/or CRNs were not always present to support handover because in this hospital both roles worked only during weekdays from 7:00 am to 4:00 pm. Outside these times (including night and weekend handovers), primary nurses had to manage handover on their own without any evaluation or help. During these times participants experienced more problems at handover. A nurse from ER complained: *"When there is no one (charge nurse or CRN) watching us handing over, nurses kind of perform less and this leads to more problems happening."* The Surgical unit charge nurse added to this: *"when I am back here after weekends, I receive so many complaints from the nurses of problems that happened at handover while I am away at the weekend."*

4) Problems Related to the Mediating Effect of Rules (Handover Norms and Procedures) on the Subject-Community Information-Sharing Relationship

-Handover procedures: the type of handover (one-on-one or team handover) was dictated by each unit and was able to negatively affect the charge nurse and CRN tasks. It was hard to observe and assist nurses' information sharing styles if the handover procedure was one-on-one, but easier with team handover. The ICU CRN complained about these handover procedures: *"it is hard for me to help nurses here (ICU) [one-on-one handover procedures]- they are all handing over at the same time and I can only attend one or two [handover procedures] at a time."*

-Primary nurses' lack of training: when the hospital first employs a nurse, s/he is trained by a unit-specific CRN for one month on all nursing duties, including handover. However, new nurses believed they received little training on handover information-sharing procedures and indicated that they found it difficult to completely comprehend information shared during handover. They also commented that they did not know how to best perform a handover as a Surgical nurse commented: *"Some new staff have difficulty understanding when we hand over to them, and also when they are handing over to us it is difficult to understand what they are trying to say [share information]."* Another nurse from ICU commented on her experiences she indicated: *"When I was new I felt overwhelmed during handover, it was hard for me to understand what [the information] they were saying, I was not trained enough."* Interviewees agreed on the lack of training nurses received in terms of handover procedures as the ER CRN stated: *"When nurses first come here we train them on how to hand over very generally, but I think they need more training."*

DISCUSSION AND IMPLEMENTATIONS

This exploratory study followed a qualitative research method using AT as a lens to explore the socio-technical, environmental and organisational problems associated with information sharing during handover, this study aims to answer the following research question: *What are key information sharing problems that nurses experience during shift handover?* Results indicate that AT is a useful theory that allows for a holistic view of handover

information sharing problems. Additionally AT provides a useful set of key constructs and relationships between these constructs to analyse and better understand the nature and origin of handover information-sharing problems.

The findings confirm that nursing handover is a complex activity with a variety of information sharing challenges from many perspectives (Chandralekha and Behera 2010). Two key elements that can be identified as problem areas for handover information sharing are: 1) supportive process and tools to facilitate handover and 2) individual nurse's approach and style of handover.

1) Supportive process and tools to facilitate handover

Processes and tools used to prepare and conduct handover were non-standard throughout the hospital. Each unit has its own handover information sharing format, style and requirements. For example Surgical, ER, and OB&GYNE all used different handover tools, standards and requirements. Nurses indicated that it is difficult to integrate different sources of information in preparation for handover in all three units. As a result specific information is often missed or left out during verbal information sharing or from documented handover artefacts used to share information. On the contrary, the ICU unit combined information from different sources into one integrated system. This helped nurses to compile handover information in a timely fashion since all information had a similar look and feel coming from a single source.

Another critical problem is key information is often /or could be overlooked during shifts which may be attributed to the lack of supportive handover artefact. It is found that artefact used during verbal handover influenced the structure and type of information shared. Findings indicate that there are more cases of missing information in the Surgical unit as opposed to other units. An absence of a handover sheet in the Surgical unit results in difficulty in sharing information, as more effort is required by nurses to successfully integrate and choose handover information from different information sources. Although OB & GYNE handover sheet is not specific, nurses experienced less missing information than the Surgical unit, which may be attributed to the required nature of this unit's patient care. However, in any unit high quality handover depends on supportive tools and systems and a solid content-foundation on which handover can be based. One such element is a standard handover tool in the form of a single handover artefact that forms the basis for information sharing during handover. The use of a standard artefact for handover may contribute to more effective information sharing with less cases of missing information.

Furthermore, the appropriate use of language is instrumental in verbal handover information sharing and can alleviate confusion, anxiety or adverse events particularly when verbal handovers are conducted in a rush (Payne 2000). Language studies have suggested that persons with limited English proficiency face barriers to provide appropriate patient care (Weech-Maldonado et al. 2003). Hospital management should only recruit nurses with a high level of English, who are able to deliver and understand correct information shared in the English language.

2) Individual nurse's handover performance (approach, style and application of knowledge)

The individual nurse's approaches and styles of handover are significantly difficult which impacts on handover information sharing. For example, it is found that some necessary patient care could be neglected if the outgoing nurse does not share that specific information verbally and the incoming nurse does not take the time to read the recorded information. Thus, incoming nurses should confirm verbal shared information by reading the recorded information. If nurses are just to rely on verbal information this can be problematic, especially that interpreting speech can be difficult due to the different accents and pronunciations.

The Nurses' shift work relies heavily on the information shared during handover; it influences the delivery of care towards the patients during the shift (Bardram 2005). The document named nursing notes that nurses compiled in preparation for handover, are often verbose, incomplete, containing unimportant and insignificant information from incoming nurses' perspective. Some nurse's notes often use unknown abbreviations with illegible handwriting which complicated handover information sharing and often force incoming nurses to make conclusions from given information or wasting time to verify this information.

The evidence from this case study indicated that using ICIP in the ICU holds many advantages in terms of information sharing. By using ICIP nurses do not have to experience any negativity towards others' handwriting. Furthermore, nurses in ICU experience less problems regarding updating patients' information. Nurses only need to document their nursing notes, ICIP automatically collects and stores all other data and information such as: vital signs measured, input information related to the patient and infusion rates. ICIP would then present this data on the screen and nurses just have to click the approval button to store these results.

Nurses with expertise such as CRNs and charge nurses when engaging in handover provide additional insights and increase the quality of handover (O'Connell and Penny 2001). However, nurses perform less in the absence of such help. This may be attributed to the lack of education practices and training nurses receive in the area of handover. It is found that there is no clarity on the information required to be shared for effective handover. It is also important to educate nurses that handover information sharing is irrelevant unless it results in action appropriate to the patients' necessities.

CONCLUSION

The aim of this paper is to explore the information sharing problems experienced by nurses during shift handover in clinical settings. Based on evidence found, nurses face different types of information sharing problems that can affect their nursing tasks during shifts. It is clear from the findings that nurses require appropriate standards, supportive artefacts, reliable IT and an encouraging community to guide effective information sharing during handover. It is hoped that the findings provided in this study could assist hospital management teams in developing interventions that can promote better information sharing at handover. Health informatics systems developers may also benefit by having a concrete definition of handover, the information needed for effective information sharing and the requirements for IT systems that meet the needs of nurses to conduct successful handovers. The results of this study are based on one public hospital in Saudi Arabia. Further research is now needed to examine if these study findings apply in different settings and other countries.

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