INFORMATION TRANSFER FOR MULTI-TRAUMA PATIENTS ON DISCHARGE FROM THE EMERGENCY DEPARTMENT: MIXED-METHOD NARRATIVE REVIEW

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ABSTRACT

AIM: This paper is a report of a review conducted to identify: a) best practice in information transfer from the emergency department for multi-trauma patients; b) conduits and barriers to information transfer in trauma care and related settings; and c) interventions that have an impact on information communication at handover and beyond.

BACKGROUND: Information transfer is integral to effective trauma care, and communication breakdown results in important challenges to this. However, evidence of adequacy of structures and processes to ensure transfer of patient information through the acute phase of trauma care is limited.

DATA SOURCES: Papers were sourced from a search of 12 online databases and scanning references from relevant papers for 1990-2009.

REVIEW METHODS: The review was conducted according to the University of York's Centre for Reviews and Dissemination guidelines. Studies were included if they concerned issues that influenced information transfer for patients in healthcare settings.

RESULTS: Forty-five research papers, four literature reviews and one policy statement were found to be relevant to parts of the topic but not all of it. The main issues emerging concerned the impact of communication breakdown in some form, and included communication issues within trauma team processes, lack of structure and clarity during handovers including missing, irrelevant, and inaccurate information, distractions and poorly-documented care.

CONCLUSION: Many factors influence information transfer but are poorly identified in relation to trauma care. The measurement of information transfer, which is integral to patient handover, has not been the focus of research to date. Nonetheless

documented patient information is considered evidence of care and a resource that

affects continuing care.

INTRODUCTION

Information processes are important for communicating all patient care. For multi-trauma patients (who have injuries to more than one area of the body) communication issues may be further intensified by care context, time, patient acuity, patient complexity and number of people involved in their care.

Information transfer is the process surrounding the transition of patients between departments/wards. This is a larger process than handover, which is often referred to as a discrete point in patient transition. Information transfer includes the lead up to handover and the remaining information accessible after the handover is complete. For multi-trauma patients this includes trauma team communication, handover and the documentation process. Information transfer for trauma patients is especially crucial, as trauma care is usually given by many inter-disciplinary teams that provide acute and ongoing care, often at the same time. Effective information transfer enables quality patient care and is a vital aspect of patient transition and handover in all care contexts.

Internationally, strategy development for prevention and management of trauma is a high priority (Peden et al. 2002). Unintentional injuries were the six highest cause of death for males and females combined, worldwide, in 2004 (World Health Organisation 2008). In Australia in 2004-05, the principal diagnosis of 'Injury, poisoning and certain other consequences of external causes' was the second highest reason for public hospital separations/discharges (AIHW 2006). Once trauma occurs, a number of factors are believed to influence patient outcomes, but are not yet completely understood (Richmond et al. 2003).

Communication is the cornerstone of teamwork (McFetridge et al. 2007, Miller et al. 2009), especially for teams that provide care for multi-trauma patients (Bergs et al. 2005). Poor communication can cause serious breakdowns in continuity of care and inappropriate treatment, which may be harmful to the patient (World Health Organization - collaborating centre for patient safety solutions 2007, Wong et al. 2008). While a trauma team may manage a patient with a single severe trauma very well, often more people are required to care for a patient with multiple severe injuries. As a result, communication of patient information may not be optimal because care and team dynamics become more complex, increasing the opportunity for error and reducing the quality of ongoing care.

Communication of patient information is such a vital issue in many countries that international collaboration is occuring on a number of projects. One such joint project is "Priority Program 5 – National Clinical Handover Initiative", administered by the World Health Organization (WHO) Patient Safety Alliance and the Australian Commission for Safety and Quality in Health Care (Australian Commission for Safety and Quality in Health Care 2007). This project includes a number of different initiatives using different methods which were piloted across Australian healthcare settings to improve clinical handover. The outcomes of these are to be adapted for healthcare settings in developing countries.

The inherent risks of communication breakdown for any patient transition are worrying, but may be magnified when considering the increased patient acuity and time pressures present in trauma care.

THE REVIEW

Aims

This literature review was the first phase in a multi-phase intervention study designed to improve information transfer for multi-trauma patients. The aims of the literature review were to identify:

a) best practice in information transfer from the ED for multi-trauma patients.

b) conduits and barriers to information transfer in trauma care and related settings.

c) interventions that impacted on information communication at handover and beyond and their effect.

Design

This narrative review followed the principles described in the University of York's Centre for Reviews and Dissemination guidelines for undertaking reviews in health care (Centre for Reviews and Dissemination 2009). An initial search identified gaps in the literature describing and/or testing transfer of multi-trauma patients, and indicated the need for a narrative review.

A conceptual framework of the mechanics of patient transition points from trauma occurrence to discharge from acute care was initially mapped. With input from clinical experts (trauma service, trauma team, intensive care and emergency clinicians) and our clinical experience, the issue of what constitutes difficulties in patient transition at these points was identified. Although the research study for which this review was conducted concerns multi-trauma patients only (due to scope of the study, time and resource constraints), studies on other acute care transition points (for

information transfer and surrounding issues such as trauma team performance, clinical handover and communication during the acute phase of trauma resuscitation) were also included in the review.

Search methods

The search was limited to papers published between 1990 and 2009, as 1990 was the earliest date when trauma systems and trauma teams were studied and reported. A systematic search of general to specific terms limited to English in relation to trauma and communication was conducted via the databases of Medline, OVID, CINAHL, Proquest, Blackwell Synergy, Google Scholar, Ingenta, PubMed, Science direct, EBSCO, Informit and Cochrane Database. The reference lists from retrieved papers were also checked for other relevant studies.

Search terms were cross-referenced with each other (e.g. Trauma AND documentation). Terms included trauma (care, injury, nursing, teams, communication, documentation, chart), emergency (department, care, documentation), information (continuity, transfer, patient, transmission), handover (patient, handoff, nursing, clinical), documentation (clinical, nursing), transfer (inter-hospital, patient, intra-hospital), transition points, continuity of care, transition care, patient outcomes.

Inclusion of studies in the review was based on issues identified in the literature and by us and the expert clinicians we consulted. Studies were included if they addressed one or more aims of the review. There have been numerous published studies in some topic areas, for example clinical handover has many studies (Wong et al. 2008), but not all were included in this review. Studies were excluded if the issues or

interventions were not related to trauma care and issues of information transfer at inter-department transition points.

Titles and abstracts were scanned for possible relevance to the review aims. The process of selection continued with data extraction. As the studies were read through and a data extract sheet completed, if the content was not relevant, the paper was excluded.

Search Outcomes

In the absence of specific studies related to trauma-specific information transfer, any studies including surrounding issues of patient, team and process factors affecting communication of patient care were assessed for inclusion in the review. Initial searches after scanning titles identified 316 possible papers to be included. Data extraction sheets were then completed for all papers, and further inclusion and exclusion decisions made. In total, 50 papers were included in the review.

Quality Appraisal

Included papers were those published in peer-reviewed journals or from government websites. As there were no papers that addressed this topic in its entirety, any study report that could be reasonably linked to the inclusion criteria was included. No formal appraisal of study quality was undertaken.

Data Extraction

For each paper a cover sheet was completed summarising date, author, paper title, problem definition/objective, background, methodology, ethical issues, sample,

sample size, data collection strategies, results/findings/conclusions, strengths, limitations, and relevance or link to study topic.

Data Synthesis

The conceptual framework for this mixed method narrative review was initially developed based on discussions with clinicians in the field of trauma care. This was for the purpose of guiding the analysis of the current body of knowledge in the area of information transfer for multi-trauma patients. Analysis of the identified literature then involved a narrative synthesis aimed at analysing relationships within and between studies, especially as the studies were too diverse to combine in a meta-analysis (Centre for Reviews and Dissemination 2009). This involved critical analysis of the content, with an interpretive focus of themes from studies that were considered relevant to the topic. The papers analysed were limited to research papers, literature reviews and government reports. After reading articles in detail, the aims and outcomes of the papers were compared to identify similarities. The content details were tabulated into issues identified in each paper, for example, effect of interruptions on nursing documentation, the use of whiteboard as a strategy to improve communication (see Tables 1-4). These issues were then condensed into overarching themes and specific factors that affect information transfer for multi-trauma patients and the conceptual framework was modified based on the issues and themes identified. Individual studies were reported on and their importance for the topic discussed.

RESULTS

The four overarching themes having an impact on information transfer for multi-trauma patients were: impact of trauma teams, communication, documentation and clinical handover. Within these themes, a number of factors emerged: patient factors, team factors, process factors, ethics, resources, organisational factors, legal elements, environmental factors and individual (healthcare professional) performance factors.

The results are discussed below under these headings and the applicable factors are listed at the end of each section. Further details of the individual studies, tabulated under the overarching theme, can be seen in tables 1, 2, 3 and 4, while the relationship of factors to overarching themes can be seen in Table 5.

Trauma Teams

Trauma teams (TTs) are usually multidisciplinary teams specifically formed for immediate, expert assessment and treatment of a trauma patient (Wong and Petchell 2003). Despite the belief of many clinicians that TTs improve care outcomes, many countries have a varied uptake of the use of TTs, usually due to organisational culture and resources (Wong and Petchell 2003).

Trauma teams remain a current focus of many studies and discussions in the literature (see Table 1), with major issues centring on team composition (Cummings and Mayes 2007, Patient 2007, Wong and Petchell 2003), from which specialty the team leader should come (Wong and Petchell 2003, Lavoie et al. 2003), how effectively team members work together or perform their roles (Xiao and Moss 2001, Cole and

Crichton 2006, Sugrue et al. 1995), and team formulation and activation (Wong and Petchell 2003).

For teams to work effectively, there must be clear roles and relationships and trust that all are able to fulfil their roles (Xiao and Moss 2001). Teams termed "resistant to failure" (Xiao and Moss 2001) were those whose work and environments increased the risk of major errors and poor outcomes, but which usually avoided adverse outcomes. Trauma healthcare teams were compared to these. In the trauma care setting, factors likely to increase the risk of error (e.g. missed injuries) can be either environmental/resource-specific, patient-oriented or clinician-based (Howard et al. 2006). Practices and behaviours that reduced this level of risk included the ability of team members to work effectively in their team roles using structured audible communication (Xiao and Moss 2001).

Trauma team culture was found to have an impact on team performance (Cole and Crichton 2006), with communication skills considered fundamental to successful performance. Communication was affected by patient acuity and stability, and became more complex with higher risks for error as patient acuity increased (Cole and Crichton 2006). Failure to communicate was a common error in TT practice (Mackenzie et al. 2004), and had an impact on missing or fragmented patient care information (Howard et al. 2006). Trauma team functioning was also affected by the noisy, busy environments inherent in trauma care (Cole and Crichton 2006).

Factors related to the Trauma Team theme included individual performance of team members (knowledge, skills and attitudes), patient complexity, acuity and

neurological status, and access to enough additional information (history, co-morbidities usually from family/ambulance staff). Overall, team issues and performance, legal issues, resources and environment were also identified as relevant.

Communication

Transition points for patients are high risk areas for patient safety (Wong et al. 2008). As a result discussions about best practice at transition points of care are becoming more prevalent (World Health Organization - collaborating centre for patient safety solutions 2007). Patient transition linked to safety has become an international priority. Until very recently this issue has only attracted small amounts of research and local policy-making (or none at all) to inform patient care, but is fast being developed at national and international levels. Some examples of this include WHO initiatives (World Health Organization - collaborating centre for patient safety solutions 2007), the WHO-commissioned Australian project called National Clinical Handover Initiative (Australian Commission for Safety and Quality in Health Care 2007) and a United States of America-based policy statement for transition of care (Snow et al. 2009).

Interest in how healthcare teams work towards facilitating survival and improving patient outcomes has led to a number of research-based reports of communication breakdown as a common issue (Bergs et al. 2005, Mackenzie et al. 2004, Xiao and Moss 2001, Cole and Crichton 2006). Overall communication in trauma teams is very complex, becomes more problematic with pressures of multiple injuries and multiple care providers involved (Bergs et al. 2005, Al-Naami et al. 2003), and is largely

unstructured during inter-department handover (McFetridge et al. 2007, Horwitz et al. 2009).

Healthcare professionals believe that quality handover of emergency patients is vital to the quality of continuing care but a number of barriers have been shown to be present in most contexts (McFetridge et al. 2007, Curtis 2001). Barriers to communication between medical officers and nurses were (i) the perceived level of nurse competence by the medical officer, (ii) that medical officers would be unpleasant and not value nurses' opinions (Curtis 2001), and (iii) the environment of emergency care includes multi-tasking with consistent interruptions, which is cognitively taxing for professionals and leaves room for errors affecting patient safety (Laxmisan et al. 2007). Nurses have indicated that episode of care coordination is often poorly managed, and that during complex or critical interactions, errors or poor care frequently occur (Curtis 2001, Miller et al. 2009). Effective communication strategies include an appropriate knowledge base, range of behavioural skills, positive attitude towards communication and the availability of opportunities to communicate (Curtis 2001). Reports of support tools for communication indicate that a whiteboard in a trauma operating theatre was effective and may be transferrable to other trauma care environments (Xiao et al. 2007).

Factors identified in this theme were patient factors, especially patient acuity and multi-trauma due to multiple health care team members involved (team factors), organisational issues, team culture, individual performance of the health care professional, the environment where clinicians are required to multi-task, process factors, and available resources. Reports that mentioned communication errors but

were better placed under other themes (e.g. documentation) are not tabulated in table 2, but are discussed under the appropriate theme.

Documentation

Investigating documentation is one way of identifying issues in information transfer which last beyond the oral handover. One review investigated how nursing documentation was evaluated and researched, finding little collaboration and agreement on auditing tools, and that most tools were not tested; this therefore prompted questions about the validity of the study results (Saranto and Kinnunen 2009).

Documentation issues directly related to trauma care were confined to trauma registry studies, being unable to find required data, and data being fragmented and incomplete (Pape et al. 2000, Probst et al. 2006) (see Table 3). All the studied registries revealed poor documentation of treatment, thus having an impact on the ability to collect data (Pape et al. 2000) .

Other related documentation issues came from the wider healthcare field and included poor quality, fragmented information and complex barriers to documentation improvement. Staff reported that they felt unsupported to manage appropriate documentation in their care contexts (Cheevakasemsook et al. 2006). Where documentation was measured, standardised documentation studies showed more positive than negative outcomes (Saranto and Kinnunen 2009), but that poor documentation also had legal and quality care impacts (Saranto and Kinnunen 2009).

Long-term improvement in nursing documentation is possible with a standardised documentation implementation tool, but also requires change in the organisational culture to be successful (Bjorvell et al. 2002), as well as providing standards and guides as resources to support education about documentation (Considine et al. 2006). Nurses have positive attitudes towards documentation but, while they demonstrate good knowledge of the documentation system, they lacked analytical skills about documented content (Darmer et al. 2004). This suggests that a high degree of management support is required for nursing documentation to be improved and maintained (Darmer et al. 2004).

Another study showed that initial assessment and evaluation of care was inadequately recorded, but then the researchers successfully used chart audit as a framework for practice development and performance improvement (Griffiths and Hutchings 1999). Documentation investigation can be problematic if audit tools do not actually measure what they are intended to, and yet audit tools are a common method in documentation research. Common factors related to documentation include legal elements, process factors, individual performance, and resource and organisation factors.

Clinical Handover

Handover is part of the process of patient transition from one care provider to another, as well as one care area to another (Australian Council for Safety and Quality in Health Care 2005). However, handovers may not provide all information that is essential for safe care (see Table 4). This can interrupt continuity of care, lead to inappropriate treatment and potentially cause harm (World Health Organization - collaborating centre for patient safety solutions 2007). A report on clinical handover

and patient safety identified three main factors that impacted upon patient safety, namely organisational, cultural factors and individual factors (Australian Council for Safety and Quality in Health Care 2005).

Primarily handover is seen by healthcare professionals as a basis for care continuity (McFetridge et al. 2007, Currie 2002, Manias and Street 2000). Only two studies examined inter-departmental handover involving the ED (Horwitz et al. 2009, McFetridge et al. 2007). One of these focused on nurses' handover and communication from ED to ICU (McFetridge et al. 2007) and found similar issues to a study of physician experiences of handover from ED to an internal medicine unit (Horwitz et al. 2009). Specifically, errors were likely when communication and interpersonal failures occurred. These were related to the need for a discrete time and place for handover without distractions, difficulties in communication, absence of a structured or consistent approach, differences in expectations, and that the quality of the handover relied on good information resources and interactive communication.

Problems within handover processes in most disciplines and contexts included lack of structure (McFetridge et al. 2007, Bomba and Prakash 2005, Horwitz et al. 2009, Borowitz et al. 2008), not understanding each other's roles and expectations about handover (McFetridge et al. 2007, Australian Council for Safety and Quality in Health Care 2005, Horwitz et al. 2009), and marked variation in content and approaches for handover (McFetridge et al. 2007, O'Connell and Penney 2001, Horwitz et al. 2009, Borowitz et al. 2008). Many of these issues were especially evident in the emergency context (Manias and Street 2000, Horwitz et al. 2009, Owen et al. 2009). Five researchers recommended the development of a guide for processes and structure for

handover (O'Connell et al. 2008, McFetridge et al. 2007, Currie 2002, Horwitz et al. 2009, Ye et al. 2007). The culture of handover between nurses has often been described negatively by nurses. Despite this, the processes were indoctrinated during practice and perpetuated by staff (Manias and Street 2000).

Fragmented communication between staff disciplines can exacerbate the problems identified (Jenkin et al. 2007, Yong et al. 2008). The oral culture in handover can mean that information is likely to be lost (Pothier et al. 2005) and, regardless of the model of nursing handover, there can be information gaps, mostly due to uncertainty about a patient (O'Connell and Penney 2001). Inadequate handovers can result in large amounts of time spent by nurses on the oncoming shift having to search for the required information (O'Connell and Penney 2001).

Inadequate handovers also include information being missing, incorrect or irrelevant. Missing information or incorrect information handed over in one study of medical staff handing over to each other in the ED were linked by participants to adverse patient events (Ye et al. 2007). Most study participants have found handover to be 'good', but this perception can change radically when they experience a handover that is inadequate and or an adverse patient event or near miss (Ye et al. 2007).

In the emergency context, a number of researchers have investigated handover from pre-hospital paramedics to ED staff. These studies have identified tensions about the transfer of information and the physical transfer of patients. This has been discussed as a tension between 'doing and listening' (Owen et al. 2009), and that when it was perceived that the 'doing' was taking priority over the 'listening', this caused

frustration and concern for the transfer of information (Owen et al. 2009, Jenkin et al. 2007, Yong et al. 2008).

When comparing strategies employed during handoffs (similar to handover in health settings) in four settings in North America (USA and Canada) with major consequences for failure (NASA space centre, a nuclear power centre, a rail road dispatch centre and an ambulance dispatch centre), similar characteristics were identified between the agencies studied and healthcare settings (Patterson et al. 2004). However the difference for patient handover was that healthcare personnel lacked knowledge of the overview status of patients and historical information displays, meaning that more information must be covered in a healthcare handover (Patterson et al. 2004). A simple trainable protocol at patient transition between wards made a positive difference for handover, resulting in a reduction in errors and missed information during handover (Catchpole et al. 2007).

A simulated experiment to assess the differences in information retention for three handover styles over a cycle of nursing handovers showed major issues with incorrect and missing data, which were attributed to the handover style used (Pothier et al. 2005). These styles were oral only, oral with note-taking, and typed information sheet with oral handover. Degradation of data was found in all styles in the study, but oral-only handover showed the most data loss until after the fifth cycle, and no original or correct data was handed over for any of the simulated patients. This data substitution was not present in the other handover styles. The note-taking group had a steady data loss, but not as much as the oral group. With the note-taking group, only 31% of data was accurate on simulation completion. The group with typed information

accompanying oral handover had very little data loss over the simulation, and retained the most accurate information (Pothier et al. 2005).

The main issues with handover were little structure and poor clarity in oral handovers where patients changed departments/wards or caregivers. Topics or issues handed over were inconsistent and the content of handovers changed with different staff. A frequent recommendation was the need for a structured guide for handover of patient information. Other problems identified included missing information (particularly in documented information), distractions, lack of confidentiality and irrelevant and inaccurate information given. Interventions that were implemented showed positive outcomes when focussed on improving the structure of handover. Factors identified as specific issues for clinical handover include process factors, patient factors, resources, individual factors, environment and ethical elements.

DISCUSSION

Review Limitations

Due to the limited number of papers directly applicable to this topic, similar issues in other care contexts were reviewed and links to the trauma care context presented. There was no consistency in the research designs used for the studies reported, and therefore this review is a critical analysis of the content only. There was a lack of quality appraisal for individual studies. All evidence was included irrespective of study quality, this is a weakness when interpreting findings and may reduce the ability of findings to be generalised. The review was limited to papers in English, and no studies investigating the effectiveness of communication strategies in trauma-specific handovers were found.

Communication Issues

Communication quality is constantly identified as an important issue in health care, both nationally and internationally (World Health Organization - collaborating centre for patient safety solutions 2007), and especially in trauma care (Sugrue et al. 1995). A gap exists in the literature about the effects on patient care of missing, fragmented, unclear and inconsistent information. Opinions of missing information having an impact on adverse events have started to emerge from studies conducted about medical handover (Horwitz et al. 2009, Ye et al. 2007, Borowitz et al. 2008). The influencing factors have not been measured for trauma patients and they are not reported to be the focus of further study. Anecdotal evidence suggests that information transfer and consistency of information handed over is a particular issue of concern, and missing or fragmented information appears to be a continuing challenge in providing care.

Gaps in communication transfer can be the cause of serious breakdowns in continuity of care and inappropriate treatment, and these may be potentially harmful to patients (Horwitz et al. 2009, Wong et al. 2008, Ye et al. 2007, Borowitz et al. 2008). Patient safety and continuity of care when treated by multiple teams rely on good communication. When this fails, safety risks can occur. For multi-trauma patients, this can be further affected by the requirement to provide patients definitive care in appropriate time frames and the clinical context of the emergency setting, adding complexity to an already acute situation with multiple team players involved in care provision (Bergs et al. 2005, McFetridge et al. 2007, Miller et al. 2009).

The implications of communication breakdown or poor communication are so important that new roles have appeared to support information transfer to ensure continuity of care. In trauma care, an example is the Trauma Case Manager role, usually undertaken by an experienced trauma nurse to coordinate, track, communicate and organise post-resuscitation care (Curtis et al. 2006). Information transfer for multi-trauma patients can be influenced considerably by time pressure factors, the complexity of injuries and information discontinuity that results from the communication processes used and the number of transition points and care providers (for example: primary retrieval of the patient by ambulance and subsequent treatment in the emergency department, operating theatre, and high dependency or intensive care unit) (Curtis 2001).

In order to provide care successfully to multi-trauma patients, trauma teams use specific strategies, knowledge and skills to facilitate survival and reduce possible disabilities (Xiao and Moss 2001). Research has focused on how teams work towards

this goal, with communication having a major impact on outcomes (Bergs et al. 2005, Xiao and Moss 2001, Mackenzie et al. 2004, Cole and Crichton 2006). Despite its regular identification, the need for communication improvement (including aspects of both quality and quantity) has not usually been the focal point of these studies. Instead, issues or errors brought about by poor communication have been the focus, with the need for communication improvement a recurring recommendation.

Communication amongst healthcare teams was found to be affected by multiple factors related to timely treatment. In a study (Bergs et al. 2005) team communication was found to be complex due to multiple factors specific to trauma patients. Another study of handover practices for patients transferred from ED (not trauma specific patients) to the intensive care unit (ICU) showed communication to be unstructured, even though healthcare professionals thought that quality handover of emergency patients was vital to the quality of continuing care (McFetridge et al. 2007). Several improvements for communication were suggested; however, the scope of this study did not include an improvement intervention. Strategies and tools that have been tested in other care areas could be adapted to benefit trauma patients and staff.

Patient handover is a topical issue, with many resources now being allocated to improve it (for example, WHO & Australian Commission for Safety and Quality in Health Care project's National Handover Initiative). One aspect is documented information, which does not seem to be being studied as a specific factor for patient transitions. The patient record can be accessed by every healthcare provider caring for a patient, and is the definitive and unchanging repository for information about previous care. Oral handover, however, only survives for those who receive it. After

handover, unless tape-recorded and kept with the medical record (not a current practice), oral information cannot be retrieved and can be affected by memory and perception of communication. Further, when documentation is studied there is little congruence between auditing tools used, and in many cases no reporting or pilot-testing of these tools. This leads to questioning of the validity of the results, and particularly the transferability of such audit tools.

Handover as a process also relates to who has responsibility for the patient, and the strategies and structures studied in the literature were aimed at improving this process of communication during the handover as a whole. There seems to be a gap, however, in linking the documentation to support effective clinical handover. The written patient record survives far into the future and should serve to give a clinical picture of the patient that is accurate, legible, clear and precise. Continuity of care and avoidance of errors depend on this.

CONCLUSION

This review has raised a number of issues and indicated some suggestions for future research and practice. Further research should be undertaken to develop and test strategies to improve information transfer for multi-trauma patients. The perceived relationship between how documented patient information supports or informs continuing care before, after and during patient handover should be investigated. Communication strategies and tools used in other healthcare areas should be considered for how they may be transferred and adapted to trauma patient care. If strategies can be developed to help reduce barriers and prevent communication breakdown, there is great potential to improve patient care.

(Bjorvell et al. 2003), (Messam and Pettifer 2009, Kerr 2002, Sexton et al. 2004, Lally 1998, Philpin 2006, Bruce and Suserud 2005, Strange 1996, Fenton 2006, Alem et al. 2008, Yee et al. 2009, Quin et al. 2009)

(Green et al. 2001)

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Table 1: Impact of Trauma Teams

Authors, Year, Origin	Aim	1.Population 2.Sample size 3.Design	Findings & important considerations	Strengths (S) & Limitations (L)
Wong & Petchell (2003), Australia	Estimate use of trauma teams in Australian hospitals & composition, leadership & activation criteria	1. Trauma Teams (TTs) in Australia. 2. 111 hospitals (response rate of 57% -74 hospitals) remaining hospitals contacted to achieve 100% response rate. 3. Questionaries with follow up	• 56% hospitals had a TT, 95% placed TT on standby or assembled in response to pre-hospital information • Not all hospitals have ED consultant are often unavailable/difficult to contact • Reasons for no TT: not enough doctors; too few trauma patients; surgeons have commitments elsewhere/no interest; insufficient expertise; no perceived need; too close to a major trauma service • TT uptake, composition, activation & after hours changes variable	S-100% response rate
Lavoie, et al., (2003), Canada	Identify current distribution of Trauma Team Leader (TTL)role in Canada	1.Trauma centres in Canada 2. 30 trauma centres in 9/10 Canadian provinces 3. Descriptive survey	• Majority of TTLs surgeons, with ED physicians with no difference in care outcomes identified. • Lack of clear description of number of severe trauma cases or TT activations/year	
Xiao & Moss (2001), USA	Identify practices to ensure reliability in teams with high failure risk	1.Trauma Teams 2. 50 patient cases, 23 semi-structured interviews staff. 3. Observation, semi-structured interviews	Underlying strategies to ensure highly reliable, failure resistant performance in TTs were; • Learning & trusting other roles in the team • Highly shared responsibilities • Ensuring team awareness • Adaptive/anticipatory teams	L-Ongoing analysis of taped interviews occurring at publication time

Sugrue, et al., (1995), Australia	Measure overall performance of TTL role in Liverpool Hospital	1.TTLs in Liverpool Hospital 2. 50 consecutive TT activations over 2 month during 0800-1700hrs 3. Observation	• Areas that were most deficient were;
			   o Failure to write the history on the whiteboard
			   o Failure to communicate clearly with other team members
			 • Next step in improving trauma care is improve communication within TT
				L-Only gathered at one location, Data analysis not discussed

Cole & Crichton (2006), UK	Explore culture of TT – about impact of human factors performance	1.Trauma Teams 2. 6 trauma team activations, 11 semi-structured interviews 3. Focused ethnography-observation, semi-structured interviews	• Six major categories identified as affecting TT process & interactions including- Leadership, Role competence, Conflict, Communication (fundamental to TT performance), Environment (noisy, affecting interactions), Patient status & acuity • TT education should include leadership skills, team management skills, inter-professional team work, conflict resolution, communication strategies	L-Method- produces only one version of events, - allows for focus bias (i.e. on the TTL role), Small study, one centre
MacKenzie, et al., (2004), USA	Video task analysis methodology for	1. TT Anaesthesia care providers 2. 48 videos of trauma cases 3. Retrospective Video analysis	• Failure to communicate a common error, time & peer pressure stress were evident during intubating unstable or combative patients • The cognitive function from video records can provide insights to the team's cognitive	S- observable; reveals covert actions/events L-Time intensive; poor audio

	research data, & analysis	during tape review, semi-structured interviews, Questionnaires	function, often assessed verbally, video allows non-verbal communication to be assessed along with verbal- important as communication often non-verbal in nature	quality; rationalisation during review due to known outcomes
Bergs, et al., (2005), Netherlands	Describe & evaluate communication during multidisciplinary trauma resuscitation	1.Trauma resuscitation teams (Multidisciplinary) 2.205 resuscitations (12 lost due to technical problems) 3. Observation over 4 months in 2003. Resuscitations prospectively & consecutively evaluated with criteria	• Structured communication more essential in major trauma cases - group dynamics are more complex & consequences of mistakes likely more severe • Audible communication more frequent in major trauma team • Clear absence of knowledge transferral during resuscitation • Audibility of communication measured but not effectiveness • Identified the need for structured verbal communication during trauma care provision	S- Physicians focused- peer observation, Study population relevant to other TTs L-Culture affects applicability, communication effectiveness not measured
Howard, et al., (2006), USA	Assess statistical significance of missed injuries using tertiary exam at level II trauma centre	1. Trauma patients 2. 90 patients 3. Observational prospective study- implementation of trauma tertiary exam form & missing injuries tabulated	• 14% of patients had missed injuries significant to outcomes, most common missed injuries fractures in limb extremities • 1 of every 7 patients had one or more missed injuries • Factors increasing likelihood of missed injuries; patient specific & provider specific	S-Results reflective of other studies L-Not every trauma patient had a tertiary survey

Curtis (2001), Australia	Identify issues relating to nursing care of Trauma patients	1.Nurses providing trauma care 2. 4 groups of 6-8 nurses (purposive sampling) 3. Focus groups with consistent moderator, followed questions & prompts, thematic analysis	• Communication was most important issue & affected nursing practice, patient care, & nurses' feelings of themselves
			• Effective communication required;
			  o An appropriate knowledge base
			  o A range of behavioural skills
			  o A positive attitude towards communication
			  o The availability of opportunities to communicate
				L-Focus group method, nurses only - one data collection tool, Some themes discussed findings not apparent in findings discussion

Xiao, et al., (2007), USA	How a traditional whiteboard in operating theatre can support communication in dynamic & collaborative workplace	1.Communicaiton & interaction of staff with a whiteboard in an operating theatre 2. 1 whiteboard in a 6 bed surgical suite dedicated to trauma service over 5 years 3. Ethnography-Observation by 10 people over 5 years using the Distributed Cognition Model (DCM) - 300 Photographs of the whiteboard taken	• 8 ways the whiteboard supported collaborative work were identified:
			  o Task management, Team attention management, Task status tracking, Task articulation, Resource planning & tracking, Synchronous & Asynchronous communication, Multidisciplinary problem solving & negotiation, Socialisation & team building
			• Characteristics improving the communicative workplace using the whiteboard were
			  o Location & installation for common information space
			  o Interactivity & usability
			  o Expressiveness
			  o Visibility of transition points to support articulation work
				L- Only conducted at one site - questionable generalisability, descriptive summary, Analysis process open to individual interpretation & possible bias of the researcher's background colouring their observations

KEY	ED = Emergency Department, TT= Trauma Team, TTL= Trauma Team Leader			

Table 2: Issues of Communication

Authors, Year, Origin	Aim	1.Population 2.Sample size 3.Design	Findings and important considerations	Strengths (S) & Limitations (L)
Miller, et al., (2009) USA	Measure markers of key nursing behaviours in interdisciplinary teams during critical events to assess the extent of high reliability	1.Health care team members in labour rooms in 3 hospitals 2. 420 staff 3. In situ simulation based on actual events. Designed to prompt skills like leadership, situational awareness, SBAR-R, closed loop communication & shared mental model	• Inconsistent display of skills by nurses to ensure high reliability- constitutes breaches in defensive barriers necessary for ensuring patient safety • Nurses impact on team performance through transfer of critical information to teams. • A key element of a highly reliable team is shared understanding of information vital to patient care. Nurses play a major role in verifying & communicating with all team members to ensure care decisions are based on all/correct clinical information. • Nurses as individual caregivers can impact on safety of the patient at point of care through effective communication & require training to do this.	S-High fidelity simulation based on real critical events that occurred. L-Simulation is not authentic team interactions. Forced errors written into scenarios were specific to context therefore may impact on generalisability of outcomes
Al-Naami, et al., (2003) Saudi Arabia	Evaluate Quality Improvement (QI) data following a mass casualty event & it's on trauma care process & outcomes	1. All involved in a single motor vehicle crash 2. 103 injured patients. Excluded patients who did not survive initial resuscitation 3. Pilot study, Pre-designed QI forms used to collect data- from admission - 8 weeks post trauma.	• Trauma management variations through all care phases associated with a 10% (initial assessment) & 9% (resuscitation) incidence of preventable morbidity & mortality respectively due to missed injuries. • QI data in following care phases included other care areas but showed most QI indicators were present in the Emergency Room (n=218) , wards (n=54) & operating room & ICU/IMCU (n=36 each). • Preventable morbidity & mortality highest in the ER & were variable throughout other areas. • Communication becomes difficult with patient overload	S-All care for all patients was undertaken at the one hospital, so data is consistent for comparison in the study group. L-Clarity of processes was poor.
Laxmisan, et al., (2007) USA	Identify factors that constrain safe decision making in patient can in the ED. Focussed on the nature of interruptions, multitasking & shift change	1.Physicians in emergency departments in decision making capacities 2. Number of physicians not discussed, observation taken over 3 month period. 3. Non-participant observation, semi-structured interviews. Ethnography in method & grounded theory in analysis of data	• Interruptions common, varied in nature & source; average interruptions every 9mins for attending physician & 14mins for residents. • Workflow analysis shows gaps in information flow due to multitasking & shift changes. • Information transfer began at discernable points (shift change/hand-offs) & continued through other activities (e.g. documentation, consultation, teaching activities, & using computer resources). • The nature of the communication process in the ED is complex & cognitively taxing for clinicians which can compromise patient safety. • Effective functioning of ED is dependent on human aspects. Technology plays an important role in the ED but is not at full potential & is dependent on the efficiency of other departments (e.g. radiology, laboratory, pharmacy) • Multitasking is a necessary skill, but may be overwhelmed with high attendance numbers • Higher risk for errors in relation to flow of patients at triage, overlap between patient	L- Specific to one ED, in a North America

			assessment & the staff member multitasking according to assessment findings	
Snow, et al., (2009) USA	Policy statement for transitions of care	Presented at "Transitions of Care Consensus Conference" in 2007 & endorsed by many US based physician colleges & societies. Executive committees agreed to jointly develop a policy statement of transitions of care.	• 5 principles for effective care transitions developed by the Stepping Up To The Plate Alliance of the American Board of Internal Medicine Foundation are: accountability; clear, direct communication of treatment & follow-up expectations; timely feedback & feed-forward of information; involvement of the patient & family member, (unless inappropriate in all steps); respect of the hub of coordination of care • The following 8 standards of care transitions developed to uphold the above principles are: o Coordinating Clinicians o Care Plans & Transition records o Communication infrastructure o Standard communication formats o Transition responsibility o Timeliness o Community standards o Measurement	
KEY	ED = Emergency Department, ER= Emergency Room, ICU= Intensive Care Unit, IMCU= Intermediate Care Unit, QI= Quality Improvement, SBAR-R = Mnemonic for communication structure meaning: S-Situational awareness, B- background, A- Assessment, R-R –recommendation- response			

Table 3: Issues of Documentation

Authors, Year, Origin	Aim	1.Population 2.Sample size 3.Design	Findings and important considerations	Strengths (S) & Limitations (L)
Pape, et al., (2000) Germany	Identify modes & options for European trauma care documentation standardisation	1. Trauma documentation systems in Europe 2. 3 systems in 3 countries 3. Comparative review of documentation system	• Major issue in all registries was documentation quality. Data completeness reliant on amount of data collection needed. Education of those documenting is crucial to documentation completeness	S- Goal -standardisation across Europe, examples of registry's documentation L- cost calculation discussion does not fit discussion

Probst, et al., (2006) Germany	Demonstrate lessons learnt from >10years of trauma documentation. Identify possible changes as a result of changes in communication & medical & economic requirements	1.Literature on trauma registry & documentation 2. Trauma registry databases from 7 countries, United States of America, United Kingdom, Canada, France, Victoria (Australia), Euro-TARN (Europe), Germany. 3. Database & literature search, comparative review using specified success parameters.	• Systems differ greatly in regard to documentation. Success of documentation is difficult to measure. No data is available so far for rate of insufficient documentation
			• Overall beneficial influence of the documentation systems
			• Datasets of the registries are comparable in terms of general data & trauma diagnosis
			• Three aspects relevant to future development;
			  o Data entry should be facilitated as much as possible
			  o Trauma documentation systems should facilitate the recruitment of financial support
			  o A minimum dataset should be used to satisfy primary goals & completeness of documentation systems – a constant effort is required to minimise the inconsistent & incomplete datasets & publish the rate of these datasets left in their database
				S-Shows current comparative state of trauma systems internationally L-No information on why the registries were chosen other than reputation from Medline & Cochrane database findings

Cheevakase-msook, et al., (2006) Thailand	Explore complexities in nursing documentation & related factors	1. Chairman & nursing committee. 2. 15 nurses, 35 patient charts. 3. Interview, participant observation, time & motion study of nursing activities, chart audit	• Disruption of documentation: inconsistent standards & irregular charting • Incomplete charting: unnecessary data & insufficient information • Inappropriate charting: unsuitable data collection & processes • Limited nurses' confidence, competence & motivation • Ineffective nursing procedures • Inadequate nursing audit, supervision & staff development	
Bjorvell, et al., (2002) Sweden	Evaluate long-term effects of intervention on nursing documentation	1. RNs in a University Hospital in Sweden 2. 269 patient records/3 yrs 3. Quasi-experimental longitudinal design	• Evidence of improved documentation over long time - without continued support, improvement was difficult to maintain • Standardised forms improved documentation content for longer • Standardised documentation forms alone did not improve documentation. Education required with ward change agents	S-Measurement over long time, multifaceted intervention, Change agents were intervention point L-High staff turnover - diluting effects over time

Bjorvell, et al., (2003) Sweden	Find factors that RNs in acute care perceived important to documentation	1.RNs in Sweden 2. 377 RNs in 2 groups. Both groups had education. One group had further intervention program 3. Comparative descriptive design using questionnaire	• Most participants felt nursing documentation is important for patient safety • Most RN's agreed written documentation could replace verbal handovers • Insufficient time & physical facilities major barriers to documentation • Most felt had enough knowledge to document, authors acknowledge this may be because of the intensive implementation of the VIPS model in Sweden over the previous few years	L-No true control group due to the nation-wide intervention of the VIPS model, Demographics of groups was different but no analysis about this as an effect on outcomes
Darmer, et al., (2004) Denmark	Explore nurses knowledge & attitudes of documentation	1. Nurses who document 2. Study group=72 control group=57 3. Prospective, comparative, & quasi-experimental	• Both groups viewed systematic nursing assessment as important & agreed verbal handover could be replaced by written report • High degree of management support needed for documentation improvement & maintenance • Many nurses lack analytical skills in context of documentation	L- VIPS model = intervention for the study group, No true control group due to the nation-wide intervention of the VIPS model
Griffiths & Hutchings (1999) UK	Determine adequateness of documentation in nursing care plans by district nurses	1. Nursing care plans 2.103 care plans 3. Retrospective criteria based audit of patient notes. Piloted data collection tool	• Evaluation of care often inadequately recorded • Poor documentation of initial nursing assessment • Audit became framework for practice development & a baseline measure of performance	S-Data collection tool informed by literature &piloted L-Process reliant on reasons for implementation & usefulness of outcomes
Saranto & Kinnuenen (2009) Finland	Assess the research methods applied in the evaluation of nursing documentation	1. CINAHL, Pub Med & Cochrane database. Search terms; nursing documentation, nursing care plan, nursing record system, evaluation & assessment + combinations. 2. 41 publications 3. Literature review	• Many designs for researching documentation employed, but were typically retrospective. • International collaboration is not evident- all studies using different audit tools, with validity of these tools rarely tested • Standardised documentation studies showed more positive outcomes than negative • Less electronic recording in practice then anticipated • Implications of poor or inaccurate documentation have legal & quality care impact	S- clear collection & synthesis reporting L – limited to nursing documentation only but discusses patient charts as mostly being multidisciplinary, search limited to 3 databases

Considine, et al., (2006) Epping, Victoria, Australia	To examine the effect of written ED nursing practice standards augmented by an in-service education programme on the documentation of the initial nursing assessment	1.Emergency nurses documenting initial assessment on adult patients presenting with chest pain & triaged to general care cubicles
		2. Pre-test group n=78, post-tests group n=74 randomly selected from identified patient groups
		3. Pre-test/post-test design
			• Intervention included a series of written nursing standards with in-service education & real chart examples of documentation – PQRST used as a particular assessment measure
			• Results post-intervention included:
			  o Improvements in documentation of all variables assessed except for quality of pain
			  o Significant improvements in documentation of historical variables both in pre-hospital care, cardiac risk predictors & past medical history
			  o Improvements were variable for documentation of some elements of the primary survey
			  o Highlights the issue of organisational change & trying to change behaviours, further study needed on the relationship of interventions to actual behaviour changes
				S- Use of random selection of charts for review, no major changes to ED policy in this time & no other identifiable confounding variables to influence findings
				L- Use of historical control group

KEY		RNs= Registered Nurses, VIPs model = standardised documentation model name, PQRST= assessment mnemonic for Provoking/palliating factors, Quality, Region and Radiation, Severity and Timing		

Table 4: Issues in Clinical Handover

Authors, Year, Origin	Aim	1.Population 2.Sample size 3.Design	Findings and important considerations	Strengths (S) & Limitations (L)
Australian Council for Safety & Quality in Health Care (2005) Australia	Conduct a literature review on clinical handover & patient safety	Literature review. Inclusion criteria published after 1994, English, search terms: handover, communication between shift variables, & patient or customer outcomes	3 factors impacting on patient safety from clinical handover: • **System factors** = the organisation processes, continuity of care, policy & research, lack of agreement of what is best practice • **Organisational cultural factors** = communication components, organisation culture & context, staff skills, communication policy, comprehensive communication processes endorsed, evaluated & supported • **Individual Factors** = adequate expectation, measurement, development & support of good communication practices	

Wong, et al., (2008) Australia	Conduct a comprehensive review of the literature based on 5 questions on behalf of The Australian Commission for Safety & Quality in Health Care	Questions guiding the evidence based review were to identify:
		 • The highest risk clinical handover situations for patients
		 • Most effective clinical handover interventions; including critical success factors & limitations of interventions
		 • Gaps in the evidence base on handover? And
		 • Interventions which show evidence of sustainability & transferability
			• Clinical handover is high risk to patient safety with dangers of discontinuity of care, adverse events & legal claims of malpractice
			 • High risk scenarios include:
			    o Inter-professional handover (e.g. between paramedics & ED staff), Inter-departmental handover (e.g. ED to ICU), Providing verbal only handover, use of abbreviation in handover, Patient characteristics (complex cases, mental health & behavioural emergency presentations)
			 • Interventions include:
			    o Minimum data sets & Information management, Standard operating protocols, Creation of new roles to assist in handover, Education & training, Electronic tools, Reflective methods, Change management, Handover types
			 • Evidence gaps in clinical handover include
			    o Professional anxiety & handover, Frameworks & handover, Work process mapping & design methods, Education & training of students, Electronic documentation & medical records, Legal dimensions
				S-comprehensive systematic review

Messam & Pettifer (2009) UK	Identify & appraise what is known about best practice within nurse inter-shift handover & evaluate	1. Medline, CINAHL & British Nursing Index searched for: Reports, shift report, nurse handover, inter-shift report, palliative care, specialist	• Discussed from a perspective of identifying & describing best practice
			 • 3 emerging themes
			    1.<u>Purpose</u> (in addition to transferring patient care at shift change):
			      a. Facilitating patient care
			      b. Clinical decision making- assists in making sense of patient information & sharing
				S-handover viewed from a constructive positive approach
				 L- Only limited to handover within shifts, limited number

	implications for practice within a specialist palliative care unit	palliative care, hospice, verbal & non-verbal handover, audiotaped handover, communication, multidisciplinary team. Articles limited to English from 1997-2009
		2. 3 reports & 19 studies
		3. literature review
			judgements about care with oncoming nurses, allows construction & reconstruction of team goals for patient care
			   c. Staff support & education- depending on type of handover style (verbal or audio taped) can provide differing levels of staff support & education. Whether staff support should be offered within the function of handover is raised
			2.<u>Type</u>:
			   a. Maintaining confidentiality while handling sensitive information
			   b. Patient involvement
			3.<u>Content</u>:
			   a. Type of information involved –requires a framework to guide context specific content
				of databases searched, no studies beyond 2007 included.

Catchpole, et al., (2007) UK	Improve handover quality & safety for patients from OT to ICU using analogy of Formula 1 pit stop & aviation expertise	1.Ferrari racing team, health teams in OT & ICU 2. 50 patient handovers, 23 before intervention; 27 post intervention 3. Prospective intervention with direct observation of handover	• It is possible to utilise Formula 1 & aviation principles to improve handover performance • A simple, easily trainable protocol at transition point can make a performance difference. The authors postulate this may be applicable to other areas of medicine where handovers are conducted frequently, under time pressure & with limited opportunities for training • The new protocol focused on leadership, task allocation, rhythm, standardised processes, checklists awareness, anticipation & communication • A reduction in errors & missed information at handover was measured	L-Small pilot study in a specialised area, Study size too small to examine patient mortality or morbidity outcomes as a result of reduced errors
Patterson, et al., (2004) USA & Canada	Describe strategies employed during handoffs in four settings with high consequences for failure	1. Handover staff- NASA Space Centre, nuclear power plant, railroad dispatch centre & ambulance dispatch. 2. 422 hrs observation. 69 staff. 3. Observation thematic analysis	• Similar characteristics between the studied agencies & the health care setting include; all made up of complex interconnected systems, are event driven, time-pressured, are resource-constrained, have the potential for high consequences for failure • Some unique experiences for patient handover not shared by the studied locations include: health care personnel do not have 'at a glance' overview status & historical displays, meaning that more information must be covered in a health care handover than in the studied groups	S-Large amounts of observation time to collect data L- data were collected for another purpose, generalisability of findings unknown
McFetridge, et al., (2007) UK	Explore patient handover & communication between ED & ICU nurses on pt transfer from ED to ICU	1. RNs from ED & ICU 2. 12 individual interviews 16 in focus groups 3. qualitative documentation review analysis, semi-structured interviews, focus groups	• Need for identified & uninterrupted time to complete handover • No structured or consistent approach to handovers • All RNs recognised importance of handovers & its influence on quality & continuity of care • Need handover guide & collaborative approach for understanding of roles & expectations • Key content: demographics, injury details & current condition, medical history & investigations • Key documentation to be exchanged= patient details, medical & nursing notes, observation chart, investigations, fluid balance chart, drug chart	L-Discrepancy of number of nurses the authors say were in the focus groups
Currie (2002) UK	Identify content requirements of handover in the ED	1.ED nurses 2. 46 surveys distributed (61% response rate) 3. Questionnaire	• Priority of what should be included in a handover in this environment included: demographics, injury details & current condition, medical history & investigations • Problem areas identified included: missing, irrelevant or inaccurate information, distractions, lack of confidentiality, handover directed to nurse in charge rather than all nursing staff	S- checklist piloted in similar area L- Lack of detail given for checklist

Manais & Street (2000) Melbourne, Australia	Examine communication practices used among nurses during handover	1.Nurses 2. 6. (one was a co-participant in the study) 3. Participant observation, professional journaling & focus group interviews	5 major practises uncovered about nursing handover • 'Global handover' -intended to provide overview of patients, functioned as communication forum between nurse coordinators of the changing shifts • 'The examination' - scrutinised nurses & their care • 'The tyranny of tidiness' - patient tidiness during bedside handover, nurses feelings of guilt • 'The tyranny of busyness' - compulsion to perform physical tasks at patient's bedside area 'The sense of finality' - nurses driven by need to finalise/complete tasks before handing over • Regardless of negative feelings experienced utilising these processes they were replicated	S- Complete immersion of researchers in process, allowed investigation of undercurrents in communication not previously explored L-Power struggles evident in group - result of researcher immersion
O'Connell & Penney (2001) Melbourne, Australia	Discuss strengths & limitations of three handover methods (verbal in the office, tape-recorded, & bedside handovers)	1.Nurse clinicians, patients & relatives 2. 27 semi-structured interviews, 5 sites- field observations, 40 nurses for informal interviews 3. Grounded theory – interviews, & observation	• Information/content varied between nurses • Usefulness depended on the type of information handed over • Nurses more comfortable with verbal communication due to the changing context of practice - verbal culture in handover = more information likely to be lost • Regardless of the type of handover - gaps in information due to uncertainty about a patient • Fragmented communication between nurses & medical officers exacerbated problems • Lots of time spent by nurses on oncoming shift finding missing, fragmented or uncertain patient information	L-While there were three types of handover all were verbal, which serves the purpose for comparison but are variations of the same type of handover
O'Connell, et al., (2008) Melbourne, Australia	To examine nurses' perceptions of handover & determine strengths & limitations of the handover process	1. Nurses involved in handover 2. 176 nurses from 21 wards 3. Survey –quantitative & qualitative data collected & analysed	• Nurses concerned about handover process. Quality of handover information poor- information frequently missing/incomplete, irrelevant information, information often subjective. Too time consuming & frequent interruptions; Nurses value handover from the nurse responsible for care, thus decreasing the risk of 'Chinese whispers' phenomenon. • Guidelines may help make handover more streamlined with relevant consistent information • Different groups of nurses may have different handover needs: Discrepancy between staff who had worked at organisation for a long time (thought handover was too long) & those who were casual or new (disagreed with this), regardless of years of experience.	L-Study did not ask nurses what they defined subjective information as. No ability to validity issues not addressed in survey

Kerr (2002) Sheffield, UK.	Understand handover practices & functions & their implications for effectiveness	1.Nursing staff in shift handover on two paediatric wards 2. 20 handovers, 12 individual interviews & 2 group interviews 3. Cross-sectional, comparative, case study design. All interactions were audio taped. Observation (non-interventionist & semi-structured), semi-structured	• Handover practices functions included:
			  o Informational – based on patient goals & information for care continuity
			  o Social – support, stress relief within safe environment
			  o Organisational – Immediate plans for the shift, allocation etc
			  o Educational – explicit teaching through examples, experiential learning & enculturation
			• Different phases had different functions & roles for the nurses
			• Handover is a highly complex communication event
			• Emergent themes is handover is a system with inherent tensions including:
			  o Formal vs. Informal processes
			  o Comprehensiveness vs. Overload
				L-setting was specialised (paediatrics) & may have different issues in other contexts that deal with adult patients. Possibility for observer bias

		individual interviews, Group interviews at end of data collection phase	o Confidentiality vs. Family-centred care o Single vs. Multiple functionality • Handover is robust & can still function with conflicting demands opposing tensions.	
Sexton, et al., (2004) Wollongong, NSW, Australia	Compare content of nursing handover to formal documentation sources.	1. Nursing handovers in one general medical ward. 2. 23 handovers 3. Observation & audio taping, voluntary participation.	• Some handovers promoted confusion & often did not clarify issues regarding patient status, treatments or management • Haphazard nature of handovers may reflect haphazard nature of the shift, impacted on by nursing shortage, & number of casual nurses trying to 'survive' the shift. • If documentation sources are kept current, clear & concise, handover time could be shortened • Lack of clear guidelines for handover reporting • In handovers more than just simple information exchange occurred	**L**-Actual documented information not compared with handover information. In analysis context of speech is lost if large passages are broken down. Represents one ward in one hospital.
Lally (1998) Bristol, UK	Investigate the functions of nurses communication during shift-to-shift handover	1. Handover between nurses at shift change at one ward in general hospital. 2. 6 handover reports 3. Ethnography- Unstructured observation, audio tape recordings. Data recorded matched with field notes of non verbal communication	• Information transfer not the only function- also includes education, social interaction, team building & group cohesion. These multiple functions may be hidden at times & while the emphasis is on information transfer socialisation of new nurses & protection of ward processes also occurred. • Model developed for "symbolic interactionism" needs to be tested in other ward areas to be verified in different contexts – creates the handover as the place & time that nurses articulate, communicate & define their practice.	**L**- could use semi-structured interviews as a way of triangulating observed data & compare handed over information with documented information for congruence between what was said, & documented patient condition.
Philpin (2006) Swansea, UK	Part of a larger study- this articles explores & interprets elements of ritual & symbolism inherent in verbal bedside handovers & written accounts.	1.Nurses in an Intensive Therapy Unit (ITU) 2. 15 nurses 3. Ethnography, interviews & examination of documented care	• Along with transfer of information & responsibility of care both verbal & written reports convey essential meanings & group values • Both handover modes use visual & /or audible symbolic representations of care in the ITU • This representation confirms & validates acre given & espouses the value of nursing work within the unit. • Latent functions of handover are important to continuing commitment of nurses to care for patients & support each other.	**L**- Limited to one ITU in one hospital so limits generalisability. Also dealing with a fluid concept of culture within a unit therefore may be difficult to apply elsewhere
Pothier, et al., (2005) Gloucester & Bristol, UK	Assess differences in information retention for various handover styles	1. Nurses performing handover 2. 5 volunteer nurses, 12 simulated patients, 5 consecutive handover cycles with 1 hour lapse between handovers 3. Observation, descriptive analysis	• Three styles evaluated in this simulation exercise – purely verbal, note-taking style (considered traditional), & a typed sheet with verbal handover • Degradation of data found in all three groups • Verbal only style experienced the most data loss, until no original or correct data was handed over for <u>any</u> of the simulated patients. This substitution was not present in the other handover styles • Note-taking group=steady data loss, less then verbal group. At end of 5 cycles- 31% of data was accurate • Group with typed page accompanying verbal handover had little data loss over 5 cycles	**S**-Simulation= no ethical issues for outcomes affecting patient care **L**- Pilot study, Small study sample, simulated environment, therefore questionable for representation of actual practice

Horwitz, et al., (2009) USA	Identify, describe & categorise vulnerabilities in Emergency Department (ED) to Internal Medicine (IM) patient transfers	1. Medical officers & physician assistants from ED & IM 2. 139 (of possible 236) 3. Cross-sectional survey study (pilot tested for clarity & content). Financial incentive to win a book gift certificate for participating.	• 30% of respondents reported an adverse event/near miss related to ED to inpatient handoff. • These were related to difficulties in communication, differences in expectations, confusion of responsibility, lack of good information resources & work environment pressures. • Hazards ED patient transition are complex & would likely resist simple solutions. Understanding where & why vulnerabilities occur important in designing interventions. • Interactive communication integral to the quality of the transfer • Contributions to error included:
			  o Inaccurate & incomplete information (e.g. vital signs) & difficulty accessing key data
			  o Cultural & professional conflicts
			  o Crowding & high workload
			  o Non-linear patient flow &"boarding" in the ED
			  o Ambiguous responsibility for sign-out & follow up • Failures in communication were implicated in most errors & included failure of message (due to no structure of what should be included & lead to a shared mental model) • Failures of interpersonal relations (divergent across care areas & specialty groups- could be improved by having shared expectations for transfer)
				L- Survey: some data would be more detailed & be verified if interviews conducted. Hindsight bias can cause over simplifying of interactions between events. Single institution study, problems identified could not have frequency elaborated from them. Participants view communication as information transfer. Study was only for physicians, nurses communication is also seen to be vital to transfer of these patients

Bruce & Suserud (2005) Boras, Sweden	Explore nurses experiences receiving emergency patients from ambulance crews analysing handover & triage process	1. Emergency nurses 2. 6 nurses 3. Phenomenology- Qualitative descriptive interview study	• 3 elements to handover; a verbal report, handing over documentation, final symbolic handover when patient physically transferred to hospital bed. • Verbal communication between ambulance personnel & nurses very structured • Ideal handovers observed for patients with very clear & distinct medical problems • 'Difficult' handovers were for patients with significantly more complex health issues & situations • Handover was pivotal in ensuring correct care was given to the patient at an appropriate level • Other important themes included the importance of experience-based knowledge for nurses, assessment skills & type of information provided for the home situation & acceptable content of the everyday handover in opposition to the trauma patient handover & resource allocation for patients who present for non-traumatic reasons.	L- single site study, some elements of findings will be specific to processes at that hospital

Strange (1996) Devon, United Kingdom	To discover the features & functions of everyday nursing handover	1.nurses in the handover process 2. One ward of one hospital- exact numbers of handovers or nursing staff involved not discussed 3. Ethnographic study – participant observation in a	• Found it difficult to separate technical functions of handover to that of ritual behaviour • Discovered that handover served multiple functions;
			 Psychological Functions
			  • Imparting information to reduce uncertainty making care more predictable
			  • Prioritising of patient care & focus vigilance where most needed
			  • Where power, control, & responsibility of care is transferred from one shift to another
			 Social Functions
				L- No reporting of sample size. Results may not be generalisable due to cultural & role differences of nurses in different countries & locations

		ward where the researcher had worked intermittently for 11 years. No notes were taken, observations made when working as a team member	• Establishes group cohesiveness/trust • Despite hierarchy need to work as a team • Identification & management of 'deviant' cases – socialise & modify behaviours • Examination of this can uncover unwritten rules which guide social groups <u>Protective Functions</u> • Both physically & psychologically	
Fenton (2006) South Birmingham United Kingdom	To identify if the development of a guide for improving structure of handover was effective	1.Nursing staff who handover 2. 5 nursing staff, 5 handovers of 15 patients selected at random over 4 week period 3. Pre-post implementation, audit pro forma	• Staff were generally positive about using the implemented guide • There was significant improvement in 10 of the 13 categories studied • Identified the need to modify the guide to incorporate the ward team suggestions. The guide was measurable in that the staff could use it as a fill in pro forma for handover to accompany verbal handover	L-Seems to become a tested intervention only after the intervention was implemented
Jenkin, et al., (2007) Plymouth, United Kingdom	To identify the current process of information transfer between ambulance staff & ED staff during patient handover	1. Ambulance staff & ED health professionals. 2. 101 surveys distributed, 80 returned (68%) 3. Quantitative survey, using a descriptive non-experimental cross-sectional survey.	• ED staff need to be aware that a lack of listening can cause frustration on part of the Ambulance service • Ambulance service staff MUST expect to repeat handover • Handover for critically ill patients should be delivered in 2 phases. Phase 1 = essential information given immediately, Phase 2= after initial treatment has been undertaken rest of information should be given	S- Survey was piloted L- Small scale. All data collected in one region & is self-reported. Survey with hospital staff only, so was not representative of the full sample population
Yong, et al., (2008), Melbourne, Australia	1.To evaluate emergency clinician attitudes towards handover from pre-hospital paramedics 2. To determine the content & methods of paramedic handover delivery to emergency physicians	1.Emergency clinicians who receive paramedic handovers 2. 51 (of possible 79) surveys. 311 (of 1068) ambulance arrivals observed 3. Exploratory study, Questionnaire to emergency clinicians & observation of paramedic to emergency clinician handover	• ED staff mostly satisfied with handovers from paramedics • Perceived to be highly relevant except for behavioural presentations • Only 50% of staff reported referring to written handover reports from paramedics (may be due to already having verbal information & written handover not being available until at or after verbal handover. • Mostly paramedics handed over to nurses as medically assisted triage not operating at this hospital at time of study. • Nearly all paramedics handed over two or more times on the same patient to ED staff • Streamlining could be achieved by all who triage & care for patients hear handover together- difficult to implement due to most ED's processes for patient flow & allocation	S- Reasonable steps taken to decrease observer bias, but cannot rule out Hawthorne effect. Survey appropriateness in the environment (busy with many distractions). Single site study. Unable to obtain input from paramedics about perceptions of handover.

Owen, et al., (2009)
Hobart, Tasmania, Australia
	Investigate perceptions by paramedics & hospital receiving staff about what enables & constrains handover	1. Paramedics, nurses & doctors from ambulance services & ED in two Australian states
		2. 19 paramedics, 15 nurses & 16 doctors
			• Three core themes:
			  o <u>Difficulties in creating a shared mental model of patient condition</u>:- often failed to understand each other's context- contributed to by a lack of shared language.
			  o <u>Tensions between 'doing' & 'listening'</u>:- ED staff not always listening, tension existing between urgency to start patient care (ED staff) & listening to handover. Many distractions in this environment adds difficulty
				S- All relevant disciplines involved in the design
				L- Small sample size. Staff were asked for their opinion about peers & though confidentiality was assured

		3. Semi structured interviews, taped & transcribed, Grounded theory analysis,	○ <u>Fragmenting communication</u> – 'Chinese whispers' [information being lost or changed during communication sequences]:- information changed during handover process. Most felt a lack of structured handover process contributed to this problem. • Need to develop a common or shared language between ED & paramedic staff; develop shared experiences; & a standardised approach to handover	may have impacted on some of their responses
Alem, et al., (2008) Melbourne, Australia	Examine the information environment & use of tools to support medical handovers over weekends	1. Medical handovers over weekends in a metropolitan hospital. 2. Pilot survey: 15 handovers (6 on general medical ward, 9 in the emergency department) Case study: 24 handovers 3. <u>Pilot survey:</u> Observation & note taking. Collection of tools. <u>Case Study:</u> survey of equipment & tools. Developed intervention tools, Pre & post intervention observation	• Patients discussed at the discretion of the doctor handing over • No reliable discussion of all patients who were identified to be of concern with few information tools being used to support handover • Monday morning picture of events for patients over the weekend remained fragmented. • After the intervention of introducing three information tools designed to enrich the 'information environment' results were that the tools supported greater continuity in who was discussed at handover but not the content of the discussion. • Researchers need to exercise caution when intervening in an information environment. • Handover is a complex process & tools for supporting handover can have significant impacts. • The information environment is distinctly less important than face-to-face engagement & communication. Tools (especially electronic tools) need to augment without distracting information transfer.	S- observation was piloted L- Intervention tool was not piloted. Unclear explanation of method & results, needed to sort through a lot of extra information to get to basic design & sample size (all mixed in with results & background explanation). Observer effect discussed, observers very visible as handovers were between two people rather than teams

Ye, et al., (2007) Melbourne, Australia	Determine problems resulting from the ED handover, deficiencies in current procedures & whether patient care or ED processes are adversely affected	1. Patient handovers by medical staff in the ED
		2. 914 patients over 60 handover sessions in a 3 month period observed. 707 post handover surveys. 50 general surveys
		3. Multi-site study in 3 Melbourne hospitals. Handover observation with checklist completed. Post handover survey of receiving doctors 2 hours after handover. General survey of all doctors about handover.
			• Deficiencies in medical handovers exist, especially in communication & disposition of patients. Significant difference in perceived quality of handovers when information was missing.
			• While most doctors (88%) thought handover was 'good', at times information was lacking (15.4%), especially management details of care (5%), investigations (4.7%), lack of disposition (4.7%).
			• As a result of these instances, in 8.8% of cases the ED/doctor were adversely affected, & 4.7% time the patient was adversely affected.
			• Most doctors felt communication problems were with inpatient units, inaccurate & incomplete information & disorganisation.
			• Recommendations include
			    ○ development of handover guidelines,
			    ○ standardisations of handover processes,
			    ○ greater use of information technologies as tools,
			    ○ ongoing feedback to staff about handover performance
			    ○ structured quality assurance & education activities.
				S-both perceptions of handover & actual observations as measures improve validity of results. L-Observer effect could bias results; many study endpoints were subjective & open to perception. Handover at nightshift was not observed. Handover format changed in two of the EDs during the study period. Results are specific to the types of handover processes used in the study hospitals.

Borowitz, et al., (2008) Virginia, USA	To characterise the effectiveness of the sign-out process between resident physicians on an acute ward	1.Resident physicians in acute paediatric ward after night shift sign out 2. 158 (of possible 196) 3. Prospective study, survey	• Often important information is omitted from sign-out, was unstructured & variable • Effective verbal communication is crucial to for transmission of patient information • Analysis of these missed opportunities can help develop education programme for residents • On ≥ 33% of nights an adverse event or unexpected event the doctors were not prepared for but could have been anticipated & discussed at sign-out occurred. • Sign-out was not useful if the data provided was not up-to-date. • Important to include a rationale for care plan to understand context in case changes occur • Outgoing staff should anticipate problems & provide contingency plans for on-coming resident • Few education programmes teach principles of effective sign-out, but guidelines are needed	S – Prospective design L – hindsight bias due to post on call survey. Single institution study
Yee, et al., (2009) Hobart, Tasmania, Australia	To develop a standardised operating protocol (SOP) & minimum dataset (MDS) to improve shift-to-shift handover by medical & nursing staff	1. nursing & medical handovers in one hospital 2. 120 observation sessions, 112 interviews - 6 clinical areas 3.Pilot study using socio-technical approach, observation, interviews, focus groups	• SOP with a MDS developed as the process called HAND ME AN ISOBAR where each letter is expanded into handover guidelines for staff • Preparation for handover is in HAND sequence • Organisation for handover is in ME sequence • Providing environmental awareness is in AN sequence • Providing handover for individual patients with a minimum data set is the ISOBAR sequence	L- single site study Requires further testing & analysis
Quin, et al., (2009) Victoria, Australia	To evaluate the appropriateness & acceptability of 5 standardised tools for shift-to-shift handover	1. Medical staff undertaking handover to a covering night medical officer 2. 4 hospitals in Victoria, exact numbers of survey respondent not discussed 3. Pilot project. Pre tool development multiple processes in assessing environment, stakeholder input to develop Key Performance Indicators & 5 tools.	• A number of templates & checklists developed • The handover template containing minimum data set included most aspects of handover • Some sites were not properly using the templates • Suggested KPI's (in relation to data for the MET calls at night & incident reports) were seen as not useful or only a little useful, were time consuming, difficult to collect & interpret. Some believed the KPI's would give a good overview of the handover improvements over a longer period of time • Most useful documents were the organisational readiness checklist, the suggested organisational policy, the protocol for handover & the handover template.	L-much of the data collection & description of the tools was ambiguous & not helpful to the reader who does not have contextual knowledge. Cannot judge other limitations based on poor explanation of processes taken

Bomba & Prakash (2005) Wollongong, Australia	Analyse communication process during handover & identify common problems	1.Medical personnel 2.74 (of 144) 3.Mixed method design survey, observation & semi-structured interviews	• No structured process, content or location for handover • Communication breakdown caused duplication of a number of tests & procedures • Documentation problematic due to missing/inaccurate information, poor chart structure • Worse in ED due to clinical environment • Communication breakdown consisted of basic problems in the communication process	S-Findings consistent with other studies L-For applicability may need to consider the different processes involved
KEY	ED = Emergency Department, ICU = Intensive Care Unit, IM= Internal Medicine, ITU = Intensive Therapy Unit, KPI's = Key Performance Indicators, MDS= minimum data set, MET= Medical Emergency Team, SOP= standardised operating protocol, OT= Operating Theatre, RNs= Registered Nurses,			

Table 5: Relationship of factors affecting information transfer for multi-trauma patients to themes

Themes Factors	Trauma Teams	Communication	Documentation	Handover
Ethical elements				X
Legal elements			X	
Team factors	X	X		
Patient factors	X	X		X
Environment factors	X	X		X
Process factors		X	X	X
Individual performance elements	X	X	X	X
Resource factors	X	X	X	X
Organisational factors	X	X	X	X