Creating one set of patient clinical information at the end of a nursing shift.

**Running head:** One set of patient clinical information

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Abstract

Aims To explore the potential for one set of clinical information to be used at the end of shift by comparing the content of patients’ verbal clinical handover and written nursing notes.

Background The continued reliance on verbal clinical handover, in the presence of limited information within the written nursing notes, is compromising patient safety.

Design We used a qualitative method with content analysis.

Methods The transcripts of 179 digitally recorded handovers and written nursing notes, collected in 2012, relating to shift change (7am and 2pm) within general medical-surgical wards, were compared. Ten records formed the intertextual comparison.

Results Within nursing handover, care planning (29%), patient identification (18%), clinical history (15%), and clinical status (14%), accounted for most of the information conveyed. Within the nursing notes, care planning (46%), clinical status (24%), and outcomes or goals of care (12%) information, was demonstrated. Around 40% of the information presented at handover was similar to that of the nursing notes; differences related to time of delivery and nurse interactions. Nursing handover contained 80% of all the pooled information compared to the 49% within the nursing notes.

Conclusion The potential for one set of clinical information at the end of shift has been supported. More comprehensive information is delivered at handover. Differences will require system design and practice change to allow for clinical information derived from handover to form the electronic nursing notes. Experiments are currently being conducted to trial the use of speech recognition technology and one set of clinical information.
Summary Statement:

Why is this research or review needed?

- Patient safety is being compromised by insufficient clinical information transfer at end of shift handovers or within nursing notes.
- Multiple sources of information (handover, handover summary sheets, written nursing notes) are being created by nurses resulting in duplication.
- The potential for one set of patient clinical information, generated at handover, to form the permanent written account of the patient’s care within the nursing notes requires investigation.

What are the three key findings?

- Verbal handover delivers more patient clinical information than written nursing notes.
- Similarities exist within the content delivered at handover and within written nursing notes.
- The potential exists, using advanced technologies, for one set of information derived from handover to form a draft of the electronic nursing notes.

How should the findings be used to influence policy/practice/research/education?

- Comprehensive patient information delivered at handover, using structured content such as the ICCCO model, should be encouraged through policy and education of student and experienced nurses.
- Research using one set of clinical information, speech recognition and restructuring of text, may provide new answers to ongoing problems with duplication and inadequate stored patient information.
Key words: Documentation, Medical Records Systems, Nursing, Computerized, Nursing Informatics, Handover
Background

The accurate transfer of information relating to the patient’s care at shift changeover is fundamental to supporting continuity of care and delivering quality nursing care (Poletick and Holly, 2010). Clinical handover is 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’ (Australian Medical Association, 2006) (p.8). Difficulties with communication have been proposed as a key factor in adverse events with The Joint Commission on the Accreditation of Healthcare Organizations in the US reporting that 65% of all sentinel events include communication error as a contributing factor (Haig et al., 2006). Similar findings have been identified in Australian health services, with a study by Tran and Johnson (2010) demonstrating that 22% of clinical management incidents related to poor communication at handover or in nursing documentation (Tran and Johnson, 2010).

Nurses traditionally provide a verbal summary of the patients’ care at clinical handover (Pothier et al., 2005) and also write a report within the nursing notes of the patient’s health care record (Karkkainen and Eriksson, 2005). Linguistic theory informs this study and our understanding of the presentation of patient clinical information with oral communication such as clinical handover (preferred by nurses) being transitory, while written information can be accessed for long periods (Crystal, 2006) and is used when medico-legal issues arise relating to a patient (Jefferies et al., 2012). However, nurses in a study of bedside handover and written handover summaries noted that there are now three presentations of the patient’s care: clinical handover (verbal), the handover summary sheet (Poletick and Holly, 2010), and nursing notes (written). Nurses lament multiple sources of patient information and perceive this increasing complexity
(Johnson and Cowin, 2012) as possibly unnecessary or at the very least not enhancing patient care. The term ‘written’ refers to handwritten or typewritten or electronic material and represents a documented form of information throughout this paper.

We propose that even though nursing handover may provide more comprehensive information about the patient than nursing notes and continues to be the preferred form of communication of patient clinical information among nurses, nurses may rely too heavily upon this verbal information only (Pearson, 2003). For example, researchers have identified numerous shortcomings with clinical handover finding the transfer of irrelevant information and that 84.6% of information could be found in other ward documentation (Sexton et al., 2004, Wong et al., 2008). Clinical handover can be improved through the use of structured content ((Ahmed et al., 2012, Chaboyer et al., 2010a, Denham, 2008, Iedema et al., 2012, Johnson et al., 2012b, Joy et al., 2011, Quin et al., 2009, Wilson, 2011, Yee et al., 2009) returning to the bedside (Chaboyer et al., 2010b), the use of minimum data sets (Gregory, 2006, Johnson et al., 2012a, Matic et al., 2011), and electronic tools (although the lack of a written record of this information remains a problem.

Written handover summary sheets are relatively new in many health services, and although helpful for quick access to information relating to all patients, are not usually a permanent record within the patient healthcare record and increase duplication.

Nurses’ use of nursing notes also raises many issues. Nurses often do not access the notes prior to attending to patient care, while remaining adamant that verbal nursing handover is necessary before delivering care to a patient (Johnson and Cowin, 2012). Moreover, nursing notes within the patient health care record should present a chronological record of the patient’s nursing care (Cheevakasemsook et al., 2006) however, as writers emphasize, nurses continue to
document observations, or focus on nursing tasks such as hygiene (Bjorvell et al., 2003, Hyde et al., 2005) with little notation of decision making or outcomes of care (Bjorvell et al., 2003, Hyde et al., 2005, Jefferies et al., 2010, Karkkainen and Eriksson, 2005, Karkkainen and Eriksson, 2003). Some authors also confirm that the only perceived purpose of nursing notes may be to defend nursing care within a legal context (Allen, 1998, Jefferies et al., 2010).

Beyond the criticisms of the scope of the content further concerns were raised regarding the nature of the language used within nursing notes highlighting the use of fragmentary language and obscure abbreviations that may have little meaning for anyone outside of the unit (Jefferies et al., 2011). For nursing notes to provide the scope of information about the patient’s care that nurses are seeking, these notes need to provide similar information to that provided at handover.

Although the focus in the past on how nursing handover duplicates nursing notes or contains similar information to other sources of nursing documentation (Sexton et al., 2004) has been an important problem, we suggest the converse, in that the extent of this similarity of information may provide new opportunities for reducing duplication. We extend Jefferies et al.’s work to compare end-of-shift handover and nursing notes for similar patients, to confirm or refute the premise that handover does deliver more comprehensive information and could be the source for one set of clinical information.

THE STUDY

Aims

This study explores the potential for one set of clinical information to be used at the end of shift handover. We compare the content of verbal clinical handover and written nursing notes, for pa-
tients at similar points in time, to examine whether information derived from handover could shape the nursing notes within the patient healthcare record.

This study forms part of an ongoing research program exploring the capture of handover information to form a draft of the nursing notes, and informs concurrent experiments of supportive technologies for the transfer of handover information to nursing notes (Suominen et al., 2012).

Method
A qualitative method was used to examine and compare the content of handovers and nursing notes relating to the change of shift at 7am and 2pm. Matching sets of end-of-shift patient information (handover and nursing notes), collected from March to May 2012, formed the data for analysis.

Sample and setting
Verbal nursing handovers \((n = 179)\) and related nursing notes from patients across nine different clinical setting in two hospitals were included in the study. The recordings were from inpatients in settings that included aged care, and gastroenterology, cardiothoracic, gynaecology, haematology, medical assessment unit, nose and throat, orthopaedics and trauma, surgical colorectal and urology, surgical orthopaedics, respiratory and stroke unit, and vascular surgery. The inclusion of the different clinical settings ensured a range of medical and surgical patient cases were included. The distribution of patient cases where verbal nursing handovers and nursing notes were available for the same patient was 74 (41.3%) medical and 88 (49.2%) surgical patient cases. Seventeen \((17/179, 9.5\%)\) patient cases had only one set of information available; 4 (2.2%)
patients with nursing notes and 13 patients with only handover. A random sub-set of ten sets formed the sample of handovers and notes used in the inter-textual analysis.

There was a difference in relation to the style of handover between the two hospitals. One hospital (4 units/wards) delivered the nursing handover at ward stations or handover rooms away from patient contact. Except in one unit where they delivered a general handover to all incoming nurses in one room, all other units gave handover at nurses’ stations involving only the team and group of patients for that section. The other hospital (5 units/wards) delivered handover at the patient’s bedside. All units had a pre-printed sheet with a summary of their patients including information as per the unit’s own priorities.

Data

Transcripts of nursing handovers

Nursing handovers were digitally recorded at either 7am \( (n = 56, 31\%) \) or 2pm \( (n = 123, 69\%) \). An audio recorder was given to each of the nurses giving handover and demonstrations on how to use the device were delivered prior to their use. These were later transcribed verbatim and de-identified by removing all patient names and any health staff names referred to throughout the recording. This procedure has previously been used successfully and has been reported elsewhere (Johnson et al., 2012a, Prouse, 1995).

Transcripts of the nursing notes

Transcripts of the nursing notes (7am and 2pm, end-of shift) for similar patients as given at handover were also transcribed verbatim and de-identified. Matching nursing notes for the patients’ recorded handovers were extracted from the health care record within the ward area. A research assistant used an iPhone to capture a picture or image of the related text for the end-of-
shift report and this image was later transcribed away from the ward area (Sanchez & Johnson, under review). This procedure allowed for minimal use of the health care record by research staff away from other health professionals on the unit. Nurses mostly wrote their notes once towards the end of their shift (one entry) recounting events that occurred during their working hours till the time of the report. In some cases nurses documented in the notes at different times during their shift (multiple entries). This occurred when there was more than one nurse taking care of the patient during the shift or when events occurred. The majority of nursing notes in the study showed only one entry per shift ($n = 139, 77.7\%$), with some with more than one entry per shift ($n = 28, 15.6\%$). and others with more than one nurse reporting in the patient’s notes ($n = 6, 3.4\%$).

**Procedure**

The Nursing Unit Managers and Clinical Nurse Educators of the selected units were contacted regarding participation in the study. Information about the study, participant’s consent and evidence of ethics approval was sent to the areas. Written consent was obtained from all participants. Ethics approval was obtained from the research and ethics committees in the local health services and university.

**Data Analysis**

Transcripts from verbal handover recordings were analysed using NVivo 9™. Transcripts were analysed using content analysis or ‘a systematic means of measuring the frequency, order, or intensity of the occurrence of words, phrases, or sentences’ (Burns and Groves, 2009) (p. 528.)

The ICCCO model (Identification of the patient, Clinical history/presentation, Clinical status, Care plan, Outcomes and goals of care (Johnson *et al.*, 2012b) and minimum data set for nursing handover (MDS-NH) (Johnson *et al.*, 2012a) provided an initial coding framework. This frame-
work was used as it captures the structure for clinical handover and related clinical information routinely conveyed handover, with the ICCCO framework being related to the International Classification for Nursing Practice (ICNP®) (International et al., 2012).

According to the ICCCO model Discharge and transfer information corresponds to the Outcome and goals of care category but is has been presented as a separate code in this paper. Information that could not be coded in the ICCCO framework has been coded in the Other category.

Transcripts from handover and nursing notes were then compared (inter-textual analysis). A random selection of ten handovers and matching nursing notes were coded by two researchers. The researchers examined how much of the content was similar in both the handover and written notes and an estimate of the proportion of the transcripts that matched in content was also made. Inter-textual comparison procedures have been used and are reported elsewhere (Jefferies et al., 2012).

Findings

Content of verbal nursing handover

The data from the transcriptions were coded using the ICCCO model and the MDS-NH (Johnson et al., 2012a). Content and frequency of each category was studied (Table 1). The most frequent categories were Care plan (28.7%), Identification of the patient (18.2%), and Clinical history and presentation (14.5%). Nearly 85 per cent of the nursing handovers began by specifying the patient name. The patient’s clinical history and presentation was also mentioned frequently in the nursing handover. About an eighth of the transcriptions could not be coded within the ICCCO model.
Insert Table 1.

Identification of the patient was then coded using the MDS-NH subcodes including patient name (7.4%), bed number (5.9%) and to a lesser extent the patients age or social status, admitting doctor or team, clinical risks, alerts and manual handling information. Clinical history and presentation MDS-NH subcodes included reason for admission, clinical history, and procedures undertaken (6.3% to 3.5%). Current clinical status was the most frequent MDS-NH code within clinical status (4.1%) followed by current observations (2.6%). Within the Care plan category activities of daily living (ADLs) were frequently reported (7.6%), with medications (6.3%), and input and output (6%). Although there were 82 references to Outcomes of care (3.5%), resuscitation status was infrequently reported (0.5%), as was Discharge and transfer information (4.5%) (reported separately). Nurse to nurse interactions were present and relatively frequent (6.2%).

Content of the nursing notes

The data from the nursing notes were also coded using the ICCCO model and the content and frequency of each category was studied (Table 2). The most frequent categories were Care plan (46%), Clinical status (24%), and Outcome and goals of care (12%). About a tenth of the nursing notes could not be coded within the ICCCO model.

Insert Table 2 here.

Coding using the MDS-NH subcodes revealed infrequent aspects of Identification of the patient, although an emphasis on clinical risks, alerts and manual handling (2.1%) was evident. Clinical history and presentation MDS-NH subcodes focused on procedures undertaken (1.3%) and Clinical status focused on current clinical status (10.2%), current observations (6.2%) and signs and symptoms (4.6%). Within the Care plan category, the MDS-NH subcodes mainly focused on ADLs (16%) input and output (10.9%) nursing care or tasks attended (6.7%) and medications
(6.6%) (see Table 2). Outcomes were more frequent in the nursing notes than handover within MDS-NH sub codes (163/1944; 8.4%). Information about Discharge and transfer remained infrequent within the nursing notes. Using the MDS-NH subcodes, information predominantly found in the ‘Other’ category included patient wishes, requests, compliance and involvement (5.1%) and family and visitor issues (42.1%).

**Intertextual analysis: comparing nursing handover with nursing notes**

When nursing handover (NH) and nursing notes (NN) transcripts were compared on similar patients at similar times on a small subgroup of 10 patients, aspects where the two sets of clinical information were similar or deviated were identified. The ICCCO framework only was used to organize material for comparison with a pooled set of information. Information delivered in NH was compared with the information given in the NN.

There was a total of 206 references (100%) coded from 10 randomly selected nursing notes and verbal handovers, each set corresponding to the same patient’s end of shift verbal and written handover. Identification of patient was reported in detail in all NH 100% (24/24 [pooled references], compared to 8.3% (2/24) in the NN. Considerably more references to aspects of the Clinical presentation were noted in the NH (22/22 [pooled references], 100%) compared to the NN (3/22, 13.6%). Both these aspects differ substantially in the NH and NN with handover being more comprehensive. Clinical status was however frequently referred to within the NH (30/42, 71.4%) and NN (29/42, 69%). Similarly for the Care plan category 55/73 (75.3%) references were found in the NH with 45/73 (61.6%) within the NN. In the Outcome and goals of care category there were more references in the NH (13/16, 81.2%) compared to the NN (7/16, 43.8%).
NH contained more detailed information (see Table 3). Although both NH and NN transcripts showed little information relating to Discharge and transfer, NH often was more detailed.

Insert Table 3 here.

**Match/mismatch of patient information for NH and NN**

Of the total number of references in both sets (206) there were 42 references (20.3 %) in the NH and 105 references (51%) coded in the NN that had information not delivered or omitted in the other set. Omission of information occurred in 20.3% of the NH and 51% in the NN when compared to the pooled data set. Examples of the differences in the extent of information conveyed at handover demonstrate the coding differences as seen in Table 3.

Including only information about Clinical status, Care plan, Outcomes and goal of care and Discharge and transfer, information that matched both sets notes and handover represented 36.8 % (50/136 references) compared with 63.2% (86/136 references) that did not match both sets NN and verbal NH. Text relating to the Identification of the patient, Clinical history and presentation and Other coding (70 references) was not included. In the NN there is an addressograph label on each page with the patients’ identification data which includes the patient’s name, date of birth, age, address, contact number, and admitting doctor information making this redundant information. Clinical history is presented in the NN usually around the time of admission, and is usually documented by medical staff. The majority of other codes, 62.5% (15/24 refer-
ences) were related to nurses’ interactions with other nurses and with patients during handover which does not occur when documenting in the notes.

Time differences between when handover occurred and when the NNs were written represented around one-third of all mismatching information. Of all non-matching references 34.1% (NH 29 references, 29/85) were attributed to the difference in time of the reporting (ranging from 1 [6 cases] to 3.5 hours [4 cases] difference in the reporting time). Information was unlikely to be known at the earliest reporting time.

Other differences related to more information in NH being associated with issues such patient interaction or nurse to nurse communication (social or otherwise).

Discussion

We have compared the transcripts of verbal nursing handovers and the transcripts of nursing notes for similar patients at the end of shift handover time to examine the potential for one set of clinical information. The dangers of varying accounts of patient information have been identified in other studies (Johnson and Cowin, 2012). The ICCCO framework, with origins in clinical handover, was used to assist the comparison (Johnson et al., 2012b). This framework is closely related to the International Classification for Nursing Practice (ICNP®) (International et al., 2012) used for documentation of nursing care, and therefore, unlike other structured content mnemonics, has the potential to assist this endeavour. The content analysis of handover revealed an emphasis on care planning (29%), patient identification (18%), clinical or diagnosis, presenting problem, procedure (15%), and clinical status (14%) and is mostly consistent with other studies (Lamond, 2000, Sexton et al., 2004, Hardey et al., 2000, Liu et al., 2012) and other data sets (Johnson et al., 2012b). Also the content of nursing notes focused on tasks within care planning.
(46%), clinical status such as observations (24%), and outcomes or goals of care (12%) also similar to other studies or data sets (Bjorvell et al., 2003, Cheevaksemsook et al., 2006, Heartfield, 1996, Hyde et al., 2005, Irving et al., 2006, Jefferies et al., 2012). The similarities and differences in the content and language used at handover, will inform the technical aspects of information transfer proposed in future experimental studies by this team.

Content analysis revealed considerable similarities across the information conveyed within nursing handover and notes, although the proportional focus was different within the categories. The ICCCO model did capture a substantial amount of the text. Within nursing handover transcripts, care planning (29%) followed patient identification (18%) and clinical history (15%) and clinical status (14%) accounted for most of the information conveyed. Within the nursing notes transcripts, care planning (47%) was followed by clinical status (24%) and a small proportion for outcomes or goals of care (12%). Common content existed for three major categories: clinical status, care planning, outcomes and goals of care. A closer comparison provided further insights into the origins of the major differences in the other ICCCO categories and their likely meaning.

First identifying the patient varies substantially as nursing notes use of an addressograph label containing the required patient information on each page negated any need to include this information. The Clinical presentation described within the nursing notes was limited or absent and may reflect that details of the clinical presentation are recorded by the medical practitioner, and may also relate to professional boundaries surrounding the diagnosis of medical conditions. Nurses will remain reluctant to include the medical diagnosis unless additional statements are included attributed to medical practitioners. However, at handover, extensive detail on the clinical presentation is provided by nurses. Clinical alerts and signs and symptoms were more con-
sistent across both sets of data reported for the patient both in the handover and within the nur-
ing notes. Considerable consistency was also found in relation to activities of daily living, with
minor omissions in the nursing notes or handover relating to diet, hygiene and mobility. Often
comprehensive information was conveyed at handover that was not replicated in the nursing
notes; nursing handover contained 80% of all the pooled information compared to the 49% with-
in the nursing notes, thus supporting nurses’ views that more information is conveyed at hand-
over.

The tense of the statements relating to activities of daily living did vary where nursing
notes often recorded completed tasks using past tense and handover described what was to be
done in the future, presented in future tense. Any single set of information would need to consid-
er this issue when converging information.

Although there was comparable recorded information relating to medications, where
there was a difference in medications it related to nurses describing medications given at hand-
over but making no comment in the nursing notes. There may have been comments recorded on
the medication chart which were not examined in this study.

Discharge information was mostly consistent at handover and within nursing notes and
limited in both cases. Other areas such as resuscitation status were described at handover but
may not have been recorded by nurses in the notes, but could have been recorded within the
medical notes or other areas within the record. Specific patient issues such as requesting a private
room or not adhering with care recommended often appeared in the nursing notes and was de-
scribed at handover.

A large proportion of the differences in the information conveyed was related to not in-
cluding the identification of the patient in the nursing notes, not including clinical history or
presentation information in nursing notes and patient interaction or nurse interaction text. In addition, differences in the information were also found to be related to the differences in the time of writing the nursing notes and when the handover was conducted which ranged from a difference of 1 to 3.5 hours.

Implications for one set of clinical information at end-of-shift handover

Nursing handover in this and another study has been found to contain considerably more comprehensive patient information than the nursing notes (Jefferies et al., 2012). This study has confirmed this finding using both nursing handover and nursing notes data collected at the end of shift on the same patient, whereas Jefferies et al., (2012) analysed two unrelated data sets.

For the information delivered at nursing handover to be able to be recorded and used as the basis of the nursing notes several system design and practice issues would need to be resolved. These include: the need to delete patient identification information present on labels in the record, the inclusion of specific statements attributing medical diagnoses to medical staff, the extent of clinical history may need to be varied depending upon whether the patient is a new admission (avoiding replication multiple times in the record). Aspects of care planning, clinical status, outcomes and discharge planning are similar. Restructuring of the text into a logical format will allow for improved readability.

The potential to use verbal handover information as a draft of the nursing notes has been demonstrated although careful system design must follow for the convergence of information to be useful to nurses. Changes in practice may need to also occur such as the need for handover to precede the final report writing for the day, allowing for the generation of the draft for an electronic record. Contemporaneous recording of patient incidents would continue as usual. The sys-
tem would need to continue to provide options for ‘as usual’ writing of nursing notes. Technology such as speech recognition provides the medium by which handover could be recorded and a text file transferred to the electronic record for editing. This application of these results is currently being tested by these authors. Should these experiments be successful, nurses will have the opportunity to deliver verbally a comprehensive picture of the patients’ condition and care in a manner they continue to enjoy and be able to edit a re-structured file of that verbally delivered content within the nursing notes. This has the potential to reduce duplication of information or the creation of multiple patient stories as is currently occurring.

Limitations

This study sampled handovers and notes from only two time periods of a possible three (7am and 2pm). Evening shift (11pm) handover was not included and may require differing information to be considered. The sample represents medical and surgical patients and may not deliver similar findings in critical care units or other units. A large number of transcripts for nursing notes and handovers were included \((n = 179)\) although a small random sample of ten matched pairs of data were analysed in the intertextual analysis. Using a framework derived from handover to apply to the nursing notes may deliver a limited representation of the documentation.

Rigor and trustworthiness

Several strategies have been used to ensure the rigor and trustworthiness of these data and the representation. Two researchers have worked on the data using an established framework. Computerized analysis tools have been used to ensure authentic data representation and to enumerate content. Exemplars of particular codes have been presented for the reader. Transferability is evident from the multiple similarities in the content described in numerous studies described.
Conclusion

The results reported in this study indicate that one set of clinical information at the end of shift, derived through the preferred communication form of verbal handover, is possible within certain limitations. Technology such as speech recognition can be used to enact this visionary approach to patient clinical information transfer among nurses. A written record of handover can be delivered as a draft of the nursing notes, as considerably similar information is present in both handover and the nursing notes. System design and practice change is required for the full potential of this notion to be enacted in practice. Further experimentation by these researchers is currently underway applying speech recognition and restructuring of text within clinical laboratories.
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Contributions

Study design: MJ; data collection and analysis: MJ PS; manuscript preparation: MJ, PS, HS, LD, BK, JB, LH.
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