Interaction Climate and Use of Information Systems in Discharge Planning: Hospital Nurses' Perspectives

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Abstract. We report on a study in which we explored Norwegian hospital nurses' assessments of their use of information systems and the interaction climate in their cooperation with colleagues in municipalities. Our hypotheses were that the hospital size and type of department influenced how hospital nurses assessed the interaction climate with nurses in the municipalities and how they used their information systems. A cross-sectional sample survey was conducted with 20 Norwegian hospitals, and 510 nurses responded using a questionnaire. Applying a factor analysis, we identified three climate factors representing interaction climate, and found that the hospital size and type of department had implications for nurses' agreement about collaboration and medical information climate, though not for nursing information climate. Furthermore, hospital size and type of department also exerted an influence to some extent on hospital nurses' use of their information systems. Further studies should elaborate on the reason for the identified differences.

Keywords. Interaction climate, collaboration, hospital, municipalities, discharge planning.

1 Introduction

In this paper, we will address the interaction climate between the hospital and home health-care nurses. In addition, we investigate the hospital nurses' use of information systems in preparing for patients' discharge. Over the last few decades, much effort has been made to elaborate on information practices between hospitals' physicians and general practitioners (GP) in primary care, while less attention has been focused on nurses' collaboration [1]. When it comes to patients in need of continuing nursing care in the municipalities after being discharged from the hospital, nurses play a pivotal role in the collaboration and exchange of patient information, thereby ensuring

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that providers who are involved in patients' post-hospital health care have the correct and adequate information available. The quality of the interaction between nurses in hospital- and home health-care systems must improve to help meet future challenges. An increasing number of elderly and people with chronic illnesses imply that many will experience one or more transitions across hospital- and home health care [2-4]. Deficits in communication, information transfer and uncoordinated care are identified as a threat against effective patient care [5, 6] because it complicates hospital discharges [7], threatens patient safety [4, 8], lengthens hospital stays [9-11] and has been shown to increase the number of re-hospitalizations [12, 13].

The overall aim of health care is to ensure a seamless provision of care, i.e. a continuity of care throughout the entire health-care system and across all levels of care delivery [14]. As an initiative to overcome discontinuity in the Norwegian health-care system, the government launched a Coordination Reform with several suggestions for improvements. The Coordination Reform, which came into force starting in January 2012, emphasize the need for the development and deployment of electronic information systems as electronic patient records (EPR) as a prerequisite for ensuring the transfer of information that links care providers aiming to deliver safe, connected and consistent health care to their patients [4]. All hospitals and most of the municipalities (where home care nurses work) in Norway have implemented EPRs, although the use of EPR is often combined with the use of paper-based information systems [15]. Hospitals and home health-care nurses have different and incompatible EPR systems, but initiatives to develop the use of standardized e-messages has been established, thus allowing hospital nurses to be able to electronically exchange discharge information. A previous study has shown that the use of discharge summaries from hospitals to nurses in the municipalities is most often transferred by the patient or by ordinary mail [16]. Initiatives to exchange information electronically have shown that home health-care nurses report that having information available at the right time allows them to be able to prepare for a better reception of the patient when they are discharged from the hospital [17]. Nevertheless, challenges still exist in the effort to ensure the exchange of appropriate and timely information from the hospital to home health care because nurses in the two different organizations represent different cultures and have different perspectives on what and when information is relevant to exchange [1, 18].

We conducted a study to explore Norwegian hospital nurses' assessments of their interaction with their colleagues in municipalities when patients are discharged from the hospital to home health care. Our hypotheses were that the hospital size and type of department influenced: 1) how hospital nurses assessed the interaction climate with nurses in the municipalities, and 2) how they used their information systems in preparing for a patient's discharge.

2 Methods

A cross- sectional sample survey was chosen for the purpose of investigating hospital nurses' assessments of their interaction with nursing colleagues in the municipalities.

2.1 Setting and participants

Nurses at Norwegian hospitals were invited to participate in the study, and we selected providers in internal medicine, surgical and mixed (a combination of internal medicine, surgical and orthopaedic) departments because we expected to find the highest proportion of patients who needed post-hospital, community-based health care in these departments. In total, 27 Norwegian hospitals were invited to participate.

2.2 Data collection procedure

Hospitals in Norway have a different number of beds, so for the purpose of testing our hypothesis about hospital size, we included small-, medium- and large hospitals. Therefore, all Norwegian hospitals were initially stratified according to bed size, and we randomly chose 19 small (33 - 88 beds), four medium (89 - 218 beds) and four large (219 - 2046 beds) hospitals to be included in the sample. Of the total of 27 hospitals randomly selected, 20 hospitals consented to participate in our study, and all eligible nurses were identified by a dedicated contact person at each hospital. Each contact person provided us with the number of nurses who fulfilled the inclusion criteria, and the number of questionnaires sent out corresponded with that number. The inclusion criteria were: working in an internal-, surgical- or combination of these departments, having more than six months experience at the department and having a permanent or temporary-position. The contact persons identified a total of 1430 nurses who met these inclusion criteria.

We applied a researcher-developed questionnaire containing eight sections, and we also asked for demographic information. Moreover, the development of the questionnaire was based on findings from qualitative interviews with 14 hospital nurses and eight physicians [19], and previous research regarding interactions between hospital and home health-care nurses [16-18]. For the purpose of the current paper, we used a 10- item interaction scale, in which the respondents scored on a Likert scale from 1 - 5, ranging from 1, totally agreeing, to 5, totally disagreeing. Questions addressing information systems contained items on how the hospital nurses approached the home health-care nurses during the discharge planning process (use of the telephone, meetings, paper-based messages and electronic messages) and which information sources they used in their EPR when producing the discharge information. The nurses scored on a Likert scale from 1 - 5, ranging from 1 = never, 2 = often, 3 = half of the time, 4 = often and 5 = always, with content validity being based on the conceptualization of a continuity of care [20, 21]. An expert panel consisting of 11 expert nurses evaluated the questionnaire in accordance with recommendations from Polit and Beck [22], and we also interviewed 10 hospital

nurses for the purpose of testing the instrument [23]. After revisions were made, the questionnaire was pilot- tested by 39 hospital nurses. The study was approved from the Norwegian Social Science Data Services.

2.3 Analysis

The data was analysed using SPSS, version 20, and descriptive statistics were used to analyse nurses' age and years of experiences. Cross tabulation and chi-square tests were used to analyse categorical data such as gender. The interaction scale was subjected to an exploratory factor analysis (EFA) using the extraction method principal component analysis with Oblimin rotation. Prior to performing an EFA, the suitability of the data for factor analysis was assessed according to Pallant's (2010) recommendations [24].

A Kruskal- Wallis test was used to compare the differences between: 1) different hospital sizes (small, medium, large), and 2) different department types (medical, surgical, mixed). Non-parametric statistics were chosen because the data was not normally distributed, with a p-value of <.05 regarded as significant.

3 Results

3.1 Demographics

A total of 510 (35.6% response rate) nurses returned the questionnaire, including 481 women and 28 men, with a mean age of 37.8 (range 22 - 65). The nurses had approximately nine years (mean 9.83, SD ± 8.8) of experience as nurses, and had worked at the current department for 6.5 years (mean 6.54, SD ± 6.7). The nurses working at small-sized hospitals were significantly older (mean 40.3, SD ±11.1) compared to the nurses at medium- (mean 35.7, SD ± 9.0) and large-sized hospitals (mean 34.0, SD ±8.8), respectively (p<0.001). The nurses in small-sized hospitals (mean 8.0, SD ± 7.7) had worked at their current department longer compared to the nurses in medium- (mean 5.4, SD ± 5.5) and large-sized hospitals (mean 5.4, SD ± 5.1).

Table 1 shows how the proportion of nurses was distributed according to different types of departments.

Table 1. Number of nurses per department

	Frequency	Percentage
Internal medicine	236	46.3
Surgical	252	49.4
Mixed	22	4.3

3.2 Interaction climate

Three factors were revealed from the factor analysis, whose structure explained 67.4% of the variance, with Table 2 providing an overview of the items representing the three factors. The overall internal consistency for the three factors had a Cronbach's alpha of 0.77.

Factor 1 (medical information climate) reflected information transferred from the hospital physicians to the health-care service in the municipalities when patients were discharged for further nursing care (Cronbach's alpha of 0.90), Factor 2 (collaboration climate) was comprised of information about the contact between hospitals and municipalities in the planning of discharging patients (Cronbach's alpha of 0.66), while Factor 3 (nurse information climate) was related to the quality of information transferred from hospital nurses to their colleagues in the municipalities (Cronbach's alpha of 0.64).

Our hypotheses that hospital size and the type of department impacted how nurses assessed the collaboration climate and medical information climate were supported. However, no associations were found in terms of the nursing information climate.

We have collapsed the nurses' response on the value of "agree to some extent" and "totally agree" in the following detailed presentation of the nurses' score on the single variables concerning the collaboration climate and medical information climate.

3.3 Medical information climate

The factor "medical information climate" reflected information about the patients' medical diagnosis and medication needs after discharge, and statistically significant differences between nurses in small-, medium- and large-sized hospitals with regard to medical information climate were found ($p=0.008$).

Concerning patients' discharge to nursing homes and to home care nursing services, more nurses in medium-sized hospitals agreed that information about patients' *medical diagnosis* were transferred compared to nurses in small- and large-sized hospitals.

Compared to nurses in small- and large-sized hospitals, we also found that more nurses in medium- sized hospitals agreed that information about the patients' *medications* were transferred when patients were discharged to both nursing homes and home care nursing services.

With regard to medical information climate, differences between nurses in different department types were also found ($p<0.001$). Compared to nurses in surgical- and mixed departments, more nurses in medical departments agreed that information about the patients' medications were transferred when patients were discharged to both nursing homes and home care nursing services.

Lastly, compared to nurses in medical and mixed departments, a lower percentage of nurses in the surgical departments agreed that information about patients diagnosis were transferred when patients were discharged to both nursing homes and home care nursing services.

Table 2. Three-factor solution after principal factor analysis with Oblimin rotation

Items	Factor 1	Factor 2	Factor 3
The discharging physician always makes sure that information about patient's diagnosis is sent to the municipal health-care service when patients are discharged to nursing homes.	0.920		
The discharging physician always makes sure that information about the patient's diagnosis is sent to the municipal health-care service when patients are discharged to home care services.	0.918		
The discharging physician always makes sure that information about the patient's medication is sent to the municipal home care service when patients are discharged to nursing homes.	0.857		
I always know what kind of information the municipal home care service needs in the nursing discharge note.	0.846		
I feel it is easy to get in touch with the correct person in the municipal home care service when I need it.		0.795	
I experience that the hospital nurses and municipalities' nurses have a common understanding of the patient's needs after discharge.		0.763	
I experience that the nurses/contact persons in the municipality are responsive to my advice		0.745	
The nursing discharge note we sent to the home care nurses usually gives good details of the patient's need for continuing health care.			-0.834
The municipal home care service always gets the nursing discharge summary when the patient is in need of further health care.			-0.738
I always know what kind of information the municipal home care service needs in the nursing discharge note.			-0.711

3.4 Collaboration climate

The factor "collaboration climate" comprised information about the contact between hospital nurses and nurses in the municipalities in their discharge planning. Statistically significant differences between nurses in small-, medium- and large-sized hospitals with regard to collaboration climate were found ($p<0.001$). An overall finding was that nurses in small-sized hospitals more frequently said that they agreed on the collaboration climate variables compared to nurses in large- and medium-sized hospitals.

Significant differences with regard to collaboration climate were also found between nurses in different department types (p=0.001), as the percentage of nurses working in surgical departments (61.3%, N=152) who agreed that their contact persons in the municipalities were responsive to their advice was higher compared to the nurses in internal medicine (43.3%, N=100) and nurses in mixed departments (22.7%, N=5, p=0.001). The degree of agreement changed for the other collaboration climate variables, with the ratio, respectively, being that nurses in the medical departments more often agreed on the collaboration climate variables than surgical nurses and nurses working in mixed department, who agreed less.

3.5 Information systems

In relation to home health-care nurses being contacted during the discharge planning process, an overall finding for all hospital nurses was that 487 (96.3%) nurses reported that they often used the telephone, while 301 (61.9%) often used paper-based messages, 78 (15.8%) often used meetings and 37 (8.0%) often used electronic messages.

Our second hypothesis was that hospital size and type of department influenced hospital nurses' use of information systems in preparing for patients' discharge, which was also partially supported, as hospital size had a significant influence on nurses' use of telephone (p=0.006), meetings (p=0.002) and paper-based messages (p=0.027).

We have collapsed the nurses' response on the values "never" and "seldom", and named it "seldom" in the following detailed presentation of findings. Likewise, we have collapsed the values "often" and "always" to "often".

Compared to nurses in small- and large-sized hospitals, a larger proportion of nurses at medium-sized hospitals responded that they most often used telephone and meetings. Moreover, the nurses in large-sized hospitals accounted for the largest portion of the nurses who mostly used paper-based messages.
Likewise, significant differences were found regarding type of department in relation to meetings (p<0.001) and the use of paper-based messages (p=0.014).

When producing information for the nursing discharge note, a total of 90% of the nurses reported that they used EPR for this purpose. We found that 73 (14.3%) used paper-based patient records, whereas 81 (15.9%) used a combination of paper-based and EPJ (they had the option of responding on all alternatives).

As shown in Table 3, nurses' notes (written during the hospital stay) and physicians' admission notes were the most used information in the EPR when they produced a discharge summary.

Nurses working in medium-sized hospitals more frequently said that they used the telephone (98.7%, p=0.006) and meetings (30.8%, p=0.002) than their colleagues in small- and large-sized hospital. By contrast, nurses in small-sized hospitals more often reported that they used paper-based messages (65.6%, p=0.027).

Nurses working in mixed departments more often used meetings (40.9%, p =<0.001), while nurses in surgical departments more often used paper-based message than their colleagues in other departments (67.1%, p=0.014).

Table 3. Use of information sources when writing nurses' discharge note

	Physicians' admission note	Nurses' admission note	Nursing plans	Nurses' notes	Flow sheet
Seldom	35 (6.9)	67 (13.3)	91 (18.1)	13 (2.6)	116 (23.4)
Half of the time	57 (11.3)	62 (12.3)	88 (17.5)	35 (7.0)	71 (14.3)
Often	413 (81.8)	374 (74.3)	323 (64.3)	455 (90.5)	309 (62.3)

4 Discussion and conclusion

There are several limitations in this study that should be accounted for when interpreting the findings. Using a questionnaire has the advantage of collecting a large amount of data and reaching a wide range of nurses at different hospitals, though a well-known disadvantage is often a low response rate [22], which our study is an example of. However, we have an indication that the response rate might be higher than presented here due to our method of distributing the questionnaires at each hospital, as 15 questionnaires were returned from one hospital because the nurses did not meet the inclusion criteria for several reasons, or because they were on leave. It is therefore reasonable to believe that the number of eligible nurses was lower than the number of our contact persons at each hospital, although we have no information about the non-respondents. Nonetheless, the respondents who answered our questionnaire did not differ with regard to age and tenure at their current department compared to another large study conducted at 32 hospitals, in which 5,455 nurses participated [25].

Another limitation is the lack of perspectives other than those of hospital nurses. Taking both physicians' and home health-care nurses' point of view into consideration may help to deepen and broaden our understanding of the current study's result, which should be elaborated on in future studies.

Our study shows that hospital size and the type of department impacted nurses' assessment of the medical information- and collaboration climate, although such findings did not reveal any data on the nursing information climate. Our study shows that information about the patients' medical diagnosis and medication were not always transferred to home health-care nurses when patients are discharged, which is in accordance with a previous study that showed that less than 50% of home health-care nurses reported that they received the physicians discharge summary when patients were in need of post-hospital home health care [16]. The findings that differences exist between different department types in the information climate is supported from another study, in which nurses in geriatric care more often exchanged nursing discharge notes compared to their colleagues in non-geriatric care [26].

We found that nurses in small-sized hospitals more often agreed on the collaboration climate than their colleagues in large- and medium-sized hospitals. We have no explanation for these differences; however, small-sized hospitals are often

situated in local and urban districts in Norway, which makes it easier for the nurses to have an overview of the entire health-care system within their area.

Nurses working in mixed departments more seldom agreed on the collaboration climate, as these departments usually had a mixed case of patients with both internal medical diseases and surgical conditions. To what extent the plurality of the patient group influenced their assessment should be further elaborated on in later studies.

The findings that hospital size and type of department also exerted an influence on how hospital nurses reported on their use of information system demonstrates that local practices seems to be embedded in their information practices. It is worth noting that nurses used information from the physicians' admission note to a great extent when they themselves prepared a discharge note. The role of admission information seems to have a strong position in both nurses' and physicians' information production through a patient trajectory [19, 27]. Olsen et al. [26] emphasize that a lack of available and appropriate guidelines and standards for ensuring an accurate exchange of information across organizations exists, which may be a reason why in our study we identified a plurality in nurses' assessment of their interaction climate and how they used their information systems according to their hospital's size and department. Paulsen et al. [1] express a concern that the introduction of e-mail-like communication does not solve the communication and information needs that home health-care nurses have during the discharge planning process. However, our study shows that the hospital nurses have s strong tradition for using the telephone during the discharge planning process.

Lately, much effort has been made to increase and improve the interaction between hospitals and health care services in the municipalities [4]. Our study shows that the characteristics of hospital size and department exert an influence on the interaction climate and information system in use. The current study does not elicit *why* such differences exist, which is something that future studies should explore.

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References

1. Paulsen B, Romøren TI, Grimsmo A. A collaborative chain of phase. Int J Integr Care. 2013;2013(Available at:http://www.ijic.org/index.php/ijic/article/view/858/1974. Date accessed 02 April 2013).
2. Payne S, Kerr C, Hawker S, Hardey M, Powell J. The communication of information about older people between health and social care practitioners. Age & Ageing. 2002;31(2):107-17.
3. European Commission. Long-term care in the European Union. Brussel: EU, 2008.
4. Helse- og omsorgsdepartementet. Samhandlingsreformen. Rett behandling - på rett sted - til rett tid. 2009.
5. Oxman AD, Bjørndal A, Flottorp SA, Lewin S, Lindahl AK. Integrated Health Care for People with Chronic Conditions. A Policy Brief. Oslo: Norwegian Knowledge Center for the Health Services, 2008.

6. Kripalani S, LeFevre F, Phillips CO, Williams MV, Basaviah P, Baker DW. Deficits in communication and information transfer between hospital-based and primary care physicians - Implications for patient safety and continuity of care. Jama-J Am Med Assoc. 2007 Feb 28;297(8):831-41. PubMed PMID: WOS:000244485000026. English.
7. Anderson MA, Helms LB. Talking about patients: Communication and continuity of care. J Cardiovasc Nurs. 2000;14(3):15-28.
8. Cook RI, Render M, Woods DD. Gaps in the continuity of care and progress on patient safety. BMJ. 2000;320(7237):791-4.
9. Helsetilsynet. Gamle i sykehus. Innlagte 75 år og over i medisinsk avdeling 1998. Oslo: Statens helsetilsyn, 1998 IK-2697.
10. Naylor M, Brooten D, Jones R, Lavizzo-Mourey R, Mezey M, Pauly M. Comprehensive discharge planning for the hospitalized elderly: A randomized clinical trial. Ann Intern Med. 1994;120(12):999-1006.
11. Naylor MD. Transitional care of older adults. Annual Review of Nursing Research. 2002;20:127-47.
12. Kjekshus LE. Primary health care and hospital interactions: Effects for hospital length of stay. Scandinavian Journal of Public Health. 2005;33(2):114-22. PubMed PMID: 15823972.
13. Crotty M, Whitehead CH, Wundke R, Giles LC, Ben-Tovim D, Phillips PA. Transitional care facility for elderly people in hospital awaiting a long-term care bed: Randomised controlled trial. BMJ. 2005;331(7525):1110-3.
14. Reed J, Cook G, Childs S, McCormack B. A literature review to explore integrated care for older people. Int J Integr Care. 2005;5(January 1-8).
15. Faxvaag A. EPJ-monitor 2010. Norsk senter for elektronisk pasientjournal: NTNU, 2011.
16. Hellesø R, Sorensen L, Lorensen M. Nurses' information management across complex health care organizations. Int J Med Inf. 2005;74(11-12):960-72.
17. Melby L, Helleso R. Electronic exchange of discharge summaries between hospital and municipal care from health personnel's perspectives. Int J Integr Care. 2010;10(21 April): 1-9.
18. Hellesø R, Fagermoen MS. Cultural diversity between hospital and community nurses: Implications for continuity of care. Int J Integr Care. 2010;10:e036. PubMed PMID: 20422021. Pubmed Central PMCID: 2858515. Epub 2010/04/28. eng.
19. Hellesø R, Melby L. Forhandlinger og samspill i utskrivingsplanleggingen av pasienter på sykehus. In: Tjora A., Melby L. (Eds). Samhandling for helse Kunnskap, kommunikasjon og teknologi i helsetjenesten. Oslo: Gyldendal akademisk; in press.
20. Hellesø R, Lorensen M. Inter-organizational continuity of care and the electronic patient record: A concept development. Int J Nurs Stud. 2005 Sep;42(7):807-22. PubMed PMID: 16019003. Epub 2005/07/16. eng.
21. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: A multidisiplinary review. BMJ. 2003;327(7425):1219-21.
22. Polit DF, Beck CT. Nursing research: Generating and assessing evidence for nursing practice. 8th ed. Philadelphia, Pa.: Wolters Kluwer/Lippincott Williams & Wilkins; 2008. XVIII, 796 pp.
23. Haraldsen G. Spørreskjema etter kokebokmetoden. Oslo: Ad Notam Gyldendal; 1999.
24. Pallant J. SPSS survival manual: A step-by-step guide to data analysis using SPSS. Maidenhead: McGraw-Hill; 2010.
25. Hellesø R, Sjetne IS. Norwegian hospital nurses' satisfaction with the electronic patient record and associations with informational continuity during shift changes. Nursing Informatics; 2012; Montreal.
26. Olsen RM, Hellzén O, Enmarker I. Nurses' information exchange during older patient transfer: Prevalence and associations with patient and transfer characteristics. Int J Integr Care. 2012; http://www.ijic.org/index.php/ijic/article/view/879/1968. Date accessed: 04

Apr. 2013.
27. Svenningsen S. Den elektroniske patientjournal og medicinsk arbejde - reorganisering af roller, ansvar og risici på sygehuse. 1 ed. København: Handelshøjskolens Forlag; 2004. 307 pp