Process interfaces between healthcare organisations: a supply chain management perspective

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Abstract

Handover performance is important for a relevant and safe output of a medical process chain. It is suggested that handover performance is induced by three perspectives which may counterbalance each other: sharing information and communication, integrated technology, and the creation of partnerships. This assumption is supported by recent handover literature suggesting that all three perspectives jointly contribute to handover performance. However, in studying the handover interface in a multiple case study of CVA-patients organisations seem to focus on just one or two of the three perspectives. This might explain why in some more complex situations handover performance seems to fail.

Keywords: handover, classification, performance

Introduction

In creating a relevant and safe output for patients almost any healthcare process is a combination and continuation of different care steps performed by different healthcare professionals. Handover of care is the interface function at the boundary of these care steps and may occur within or between organisational units or organisations (Hilligoss & Cohen 2013). Especially handover of care between different healthcare organisations is a complex interface process in which multiple stakeholders interact and in many cases multiple streams of information are exchanged. Societal and medical developments urge for closer cooperation between healthcare organisations. As a result the complexity of the handover interface increases due to raising multidisciplinarity and the involvement of multiple expertise within the medical process chain (Cohen et al. 2011). Handover performance is an important precondition for the health outcome and safety of a patient. Despite a significant amount of research, with respect to the handover interface, handover performance remains challenging (Hesselink 2014; Cohen & Hilligoss 2010; Schoen et al. 2007).

Studies indicate that it is useful to apply Supply Chain Management knowledge on healthcare supply chains (Vries & Huijsman 2011). One of the goals of Supply Chain Management is to enhance supply chain performance by applying three activities: sharing information & communication, sharing technology, and creating active

partnerships (Cao et al. 2010). It is our assumption that these three perspectives are also important preconditions for the performance of the medical supply chain. As handover of care is the interface function within the medical supply chain it is our hypothesis that these three perspectives are also important preconditions in enhancing handover performance. This hypothesis, focussing on these three perspectives and their interaction inducing handover performance, is subject of this paper.

Methodology

In our search for an explanatory analysis of handover performance we adapted the scientific realism approach (Pawson et al. 2005). In line with our hypothesis we developed a conceptual research model (initial program theory) stating that handover performance is induced by three perspectives and their interaction: the sharing of information and communication, the integration of technology, and the creation of active partnerships (Figure 1).

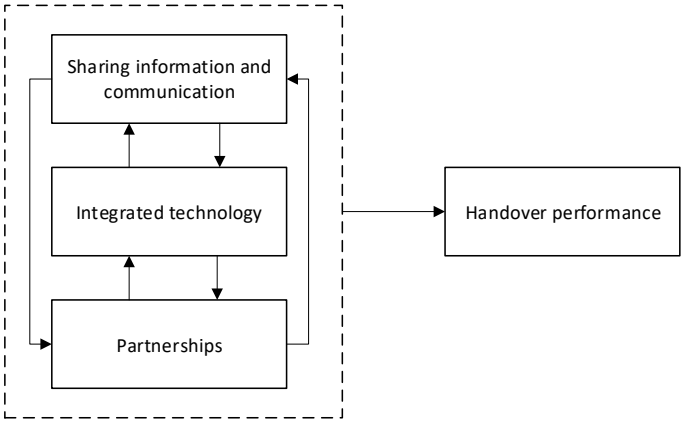

Figure 1 – Conceptual research model

A second step, according to the scientific realism approach, was a search for evidence with respect to our research model in recent handover literature discussing handover situations (Rumrill et al. 2010). Our scoping study focussed on peer reviewed papers published between 2006 and 2017 and keywords were “handover”, “handoff”, and “interface AND healthcare”. We used the SmartCat search engine and searched in medical and supply chain management literature. Initially we selected 125 peer reviewed articles which were studied and ordered. Upon further analysis 88 remained as actually dealing with handover performance and 21 papers were dealing with handover performance between organisations.

During the third phase of the research we performed a multiple case study to verify the findings of our scoping literature review. In doing so we explored handover performance in three regional hospital networks in the Netherlands. Within these networks we studied different handover situations with respect to patients suffering from a Cerebrovascular Accident (CVA-patients). We studied the transfer of these patients from the three hospitals towards a primary care situation, different nursing homes, and rehabilitation centres. In studying handover performance, we interviewed nurses, medical staff members, and policy officers. All 21 interviews were transcribed and coded. We used deductive coding, based upon our conceptual research model (Figure 1) and the results of our scoping literature review (Table 1). We also gathered observational data of handover situations and studied relevant documents, flow charts, and data management systems.

Results

Scoping review handover between organisations

Eight papers, out of 21, with respect to handover situations between organisations, are dealing with experiences regarding handover performance during the hospital discharge process. Studies indicate that patients and their relatives experience a lack of continuity of care, untailored information, and ineffective time consuming procedures (Berendsen, de Jong, Meyboom-de Jong, Dekker, & Schuling, 2009; Hesselink, Schoonhoven, et al., 2013; Hoyer et al., 2016; Rosenbluth et al., 2015). Involved general practitioners qualify discharge summaries as inadequate for a safe transition and perceive patient centeredness of information as low. An experienced high workload of professionals influences handover performance negatively (Flink et al., 2015; Gray et al., 2012; Hesselink, Schoonhoven, et al., 2013; Patterson et al., 2015; Sheu, Fung, Mourad, Ranji, & Wu, 2015).

Four papers describe the development and introduction of different tools improving handover procedures. Positive examples are the development of a process layout for verbal communication, the introduction of a personalized patient discharge letter, and the positive effect of a medicine information system (Gilbert et al. 2012; Mussman et al. 2015; Buurman et al. 2016). However, one study indicates that the use of an IT management system as such did not improve medication errors (Callen et al. 2008).

Different studies address several challenges to improve handover performance between organisations. Examples are: involving patients and their relatives in the discharge process, communicating differentially to cope with different patient characteristics, dealing with differences between health care personal's competences, incorporating the right context, and patient assessment (Storm et al., 2014; Tandjung, Rosemann, & Badertscher, 2011). Other studies formulate suggestions to overcome typical barriers like time constraints, lack of information sharing, ambiguity in provider roles, the use of different software systems, lack of common processes and policies, and lack of engagement of all involved parties (Halasyamani et al., 2006; Herrigel et al., 2016; Hesselink et al., 2014; Hesselink, Vernooij-Dassen, et al., 2013; Johnson, Arora, & Barach, 2013). To overcome these barriers studies suggest that it is important for all types of improvement to develop and implement a common leadership strategy and a collective approach with respect to handover and patient safety to overcome organisational fragmentation (Randall et al. 2014; Jeffs et al. 2013).

In some studies, specific attention is given to the discharge process of elderly people from hospital. Specific suggestions to improve these interface processes are the involvement of a community care nurse within the hospital discharge process or the introduction of a community matron (Buurman et al. 2010; Randall et al. 2014; Guerin et al. 2013).

Analysing the results of our scoping review

The results of our scoping review were categorised by applying inductive coding in line with the three supply chain management perspectives of our research model (Figure 1). In doing so, we could deduce different elements and examples of the three perspectives and their effect on handover performance. Different elements and examples, representing these perspectives as well in causing a negative effect on handover performance as inducing a positive effect on handover performance, are presented in Table 1. Whereas handover performance is defined in different studies by terms like adverse events, hospital readmission, level of ADL after certain period, satisfaction of the patient (with the intervention), and satisfaction of the professional (with the

intervention) (Berendsen et al. 2009; Hesselink, Schoonhoven, et al. 2013b; Hoyer et al. 2016; Rosenbluth et al. 2015; Schoen et al. 2007).

Table 1 – Results scoping review

SCM perspective	**elements of perspective**	**examples and effect on handover performance**	**literature**
Information & Communication sharing	○ collaborative communication ○ information exchange	○ inadequate communication: negative effect ○ missing information and communication breakdown: negative effect ○ delayed information: negative effect ○ structuring (content of) information: positive effect	Berendsen 2009 Buurman 2016 Hesselink 2013 Hoyer 2016 Rosenbluth 2015 Halasyamani 2006
Integrated technology	○ sharing assets and resources	○ use of medicines IT system: positive effect ○ IT system supports handover communication: positive effect	Gilbert 2012 Callen 2008 Mussman 2015
Partnerships – setting common objectives	○ context of patient's situation ○ goal congruence ○ overall service delivery ○ overall strategic planning ○ patient centeredness ○ relationship ○ responsibility ○ risk & benefit sharing	○ incorporate patient's context: positive effect ○ medical information not focussed on continuity of care: negative effect ○ lack of shared vision: negative effect ○ "cool" relationship hinders communication and collaboration: negative effect	Storm 2014 Buurman 2010 Flink 2015 Hesselink 2013 Hesselink 2014 Tandjung 2011 Randall 2014
Partnerships – collaboration	○ decision synchronization ○ organisational integration ○ overall capacity control ○ social coordination ○ structuring processes	○ hospital wide discharge policy: positive effect ○ collective and collaborative approach: positive effect ○ lack of structuring processes: negative effect	Buurman 2016 Jeffs 2013 Herrigel 2016 Johnson 2013 Sheu 2015 Randell 2014 Guerin 2013
Influencing elements	○ competences of personnel ○ economic incentives ○ workload	○ economic incentives urge to transfer patients: negative effect ○ sign-out composition is associated with workload: negative effect	Gray 2012 Patterson 2015

Our results suggest that a negative effect on handover performance is caused by a lack in sharing information and communication. Partnership, either focussing on common interorganisational objectives or interorganisational collaboration, is indicated as an important attribute in inducing handover performance. Integrated technology seems to have an evidential value in supporting handover performance. Some of the perspectives, like a lack of sharing information and communication, seem to be more predetermining in effecting handover performance more negatively (Berendsen et al. 2009; Hoyer et al. 2016; Hesselink, Schoonhoven, et al. 2013b), while other perspectives, like integrated technology, have a more positive inducing effect on handover performance (Buurman et al. 2016; Gilbert et al. 2012; Mussman et al. 2015;

Callen et al. 2008). Partnership, as well focusing on creating common organisational objectives as on organisational collaboration, seems to be a more establishing precondition for handover performance: negative when missing and positive in inducing handover performance (Flink et al. 2015; Herrigel et al. 2016; Hesselink et al. 2014). Other studies suggest that handover performance has to deal with the interaction and integration of all three perspectives (Halasyamani et al. 2006; Herrigel et al. 2016; Hesselink 2014; Hesselink, Schoonhoven, et al. 2013b; Johnson et al. 2013). Additionally, some contextual influencing elements like competences, economic incentives, and workload were defined by a number of authors (Gray et al. 2012; Patterson et al. 2015).

These findings of our scoping review support our conceptual research model. It is indicated that handover performance depends primarily upon the exchange of relevant information and communication to understand and share information. Integrated technology focusses more specifically on the integration of data management systems to support interactive communication and information transfer. Whereas partnerships enable common interorganisational objectives and a collaborative structure between the involved organisations.

But also some questions remain. It seems likely that these three perspectives collectively induce handover performance. But the question is if all three perspectives are equally important or if the absence of one of the perspectives may be compensated by another perspective. An example is the use of IT systems. In some studies IT systems seem to induce handover performance, while in other studies no inducing effect of integrated technology on handover performance was measured (Gilbert et al. 2012; Mussman et al. 2015; Callen et al. 2010). Some studies suggest that a positive effect on handover performance caused by one of the three perspectives can be compensated by another perspective. Other studies suggest that a jointly application of all three perspectives is necessary (Hesselink et al. 2012; Buurman et al. 2010; Halasyamani et al. 2006; Herrigel et al. 2016; Johnson et al. 2013). To gain more insight in the three perspectives, their interaction and potential compensation and counterbalance mechanisms, we performed a multiple case study.

Case study CVA-patients

Our multiple case study focusses on handover of care of CVA-patients transferred from a regional hospital towards primary care, a nursing centre, and a rehabilitation centre.

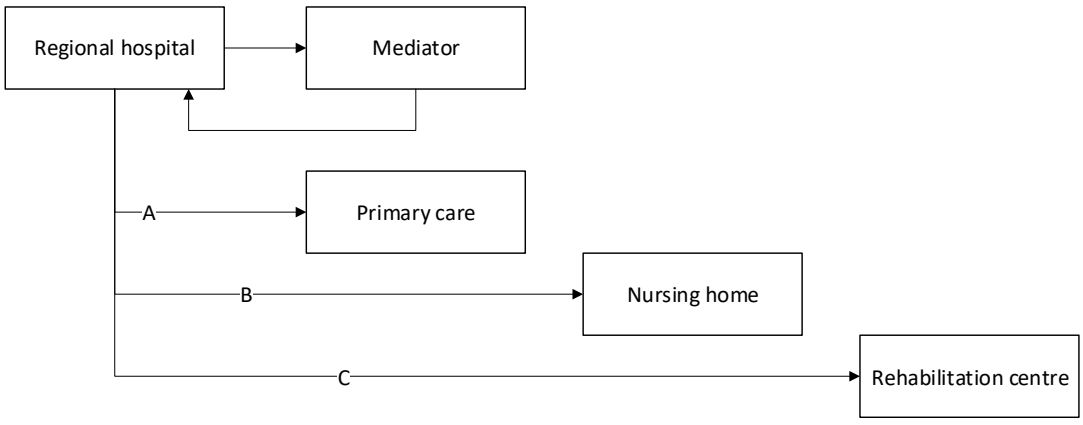

Figure 2 – Process flow handover of care CVA-patients

Three different regional networks with respect to the handover of these CVA-patients were studied. In this paper we present the results of three different handover situations within each regional network: of the transfer of CVA-patients from hospital homewards (towards primary care – A), towards a nursing home (B), and towards a rehabilitation centre (C) (Figure 2). The overall process flow of the handover process in all three networks is identical. When a patient is indicated for transfer out of the hospital, a request for handover is transferred to a mediation office. This mediation office coordinates on supply and demand between different hospitals, social care organisations, nursing homes, and rehabilitation centres. An internal hospital handover procedure is started if supply and demand match. Different letters of resignation, a medical-, different paramedical-, and a nursing letter of resignation, are produced separately and are handed over to the patients when they leave the hospital. These letters are a starting point and input for the internal handover procedure of the rehabilitation centre and the nursing home. In most situations in the primary care transfer situation also a medical resignation e-mail is generated parallelly and sent to the involved general practitioner of the patient by means of the safe E-care network environment. Though details might differ, all transfer procedures in the three investigated networks show a great deal of similarity. Some important characteristics of these procedures are presented in Table 2.

Table 2 – Characteristics of investigated handover situations

SCM perspective	**regional hospital – primary care**	**regional hospital – nursing home**	**regional hospital – rehabilitation centre**
Information & Communication sharing	○ handover file on paper ○ separate notification of hospital discharge by e-mail to general practitioner ○ hospital determined information content and communication	○ handover file on paper ○ standardised and structured information content	○ handover file on paper ○ standardised and structured information content
Integrated technology	○ additional safe E-care network	○ not present	○ not present
Partnerships – setting common objectives	○ not identified	○ not identified	
Partnerships – collaboration	○ not identified	○ multidisciplinary consulting in one of the investigated networks	○ not identified

We characterise the hospital – primary care interface as a “hospital sending” process. The hospital decides upon content of the information and the way information is communicated. No active partnerships and networks with respect to multidisciplinary or medical, paramedical, or social care were identified. With respect to integration of technology there is some connection between the hospital and the general practitioner by using the safe E-care network environment. This utility is inaccessible for social care workers or paramedical professionals in the primary care situation. In all situations information is transferred on printed paper. If necessary, the patient is responsible to continue the medical process chain by handing over these letters of resignation to the general practitioner, the involved paramedic, or the social care organisation. However,

these procedures seem to be unclear, as one of the primary care workers stated: “if we receive some information, we know hardly what to do with it”. The medical social follow-up of patients from the regional hospital is coordinated by a CVA transfer nurse. This follow up focusses on medical and social issues regarding the patient and provides no information about the status and statistics regarding handover performance.

In the hospital – nursing home situation the transfer process may be characterised as an “active standardised information” interface. There is no integration of technology: all information is transferred on printed paper, whereas “active” refers to the active incorporation of one medical staff member of just one the nursing homes in the multidisciplinary consulting meeting within the hospital. This professional has an advisory role. The standardised information sheet was developed some years ago in a multidisciplinary workgroup of the hospital and the nursing home. No actual active partnerships were identified. It was indicated in one network they were missing such a multidisciplinary network structure. Handing over the letters of resignation is a responsibility of the patient, but the involved nursing homes know patients have this information as it is gathered in an “CVA-file”. With respect to handover performance one of the participants stated: “4 out of 5 situations perform well – in 1 out of 5, complex multi- and comorbidity situations I’m missing relevant information and I need to make additional phone calls. Unfortunately, due to societal developments these situations increase”. When patients from another network hospital enter the nursing home “we miss substantial information”. Most regional hospitals indicate they hardly receive any feedback with respect to handover performance from involved nursing homes or rehabilitation centres.

We characterise the hospital – rehabilitation centre interface as a “passive standardised information” process. Standardised information is transferred on printed paper as in the nursing home situation. There is no actual active partnership. There is no multidisciplinary consulting and no integration of technology. Most patients who enter the rehabilitation centre have a positive rehabilitation status, meaning that the patient is primarily responsible for his rehabilitation process. No active feedback mechanisms with respect to handover performance were found.

Analysing case study CVA-patients

In taking a closer look at these results and confronting these results with the results of our scoping review it seems as if in each investigated handover interface situation the application of one of the three supply chain management perspective differs (Table 2). In the hospital – primary care handover interface situation there seems to be some integration of technology, but hardly any dual agreement on the content and process of sharing information & communication. Additionally, no active network or partnership structure was identified. In the hospital – nursing home handover interface situation the focus is on dual standardisation of information content, whereas some active interaction and partnership is created by the involvement of a medical staff member within the multidisciplinary consulting meetings within the hospital. The hospital – rehabilitation centre handover situation shows some similarity with the nursing home situation, but is characterised at the same time as a passive situation with respect to partnerships and the integration of technology.

With respect to handover performance it seems as if in most investigated transfer situations handover performance is adequate. Though in more complex situations handover performance seems to fail when complexity increases. In these situations complexity is induced by the medical situation of the patient. One of the reasons

complexity increases seems to be the increasing occurrence of multi- and comorbidity situations raising the amount of variety and uncertainty during the interface process. In those situations, additional information is collected.

Discussion

Starting from a supply chain view on handover performance we were able to define three important perspectives and their interaction inducing handover performance (Figure 1): information and communication, integrated technology, and partnerships. There are strong indications from our scoping review to support this hypothesis as it is suggested that a collective appliance and interaction of these three perspectives induce handover performance (Table 1). The results of our multiple case study support this supply chain view on handover situations, although organisations in our CVA cases seem to focus on just one or two perspectives (Table 2). In most situations this appears to be sufficient for a safe transfer of a patient, leaving a great deal of responsibility for continuation of the medical process chain at the patient. However, in more patient induced complex situations handover performance seem to fail. In these situations variety and uncertainty are introduced, most likely caused by increasing occurrence of multi- and comorbidity situations of the patient. In the nursing home situation it is indicated that in 20% of the situations the handover procedure seems to be inadequate. Several interviewees indicate that they are missing an active interactive partnership in those situations. It seems as if partnership in our case situations is one of the missing links. This partnership perspective is also jointly promoted in the interaction with information & communication and integrated technology by several studies from our scoping review and seems to be in line with our conceptual research model and hypothesis (Halasyamani et al. 2006; Herrigel et al. 2016; Hesselink 2014; Hesselink, Schoonhoven, et al. 2013b; Johnson et al. 2013). However, it is indicated that the necessity of a full application of all three perspectives to induce handover performance depends upon the complexity of the situation. It seems as if in less complex situations the absence of a certain perspective can be compensated by another perspective, while in more complex situations this compensation effect seems to fail. Future research should focus on the relation between handover performance, the three perspectives and situation complexity to gain additional insight in handover interface mechanisms.

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