

# THE COMPLEMENTARY ROLES OF HEALTH INFORMATION SYSTEMS AND RELATIONAL COORDINATION IN ALCOHOL CARE PATHWAYS: THE CASE OF A U.K. HOSPITAL

*Research-in-Progress*

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## Abstract

*Effective information exchange between multidisciplinary teams is crucial for coordinated patient care. Patients with alcohol use disorder pose particular care challenges because of the high probability of comorbidities, recurrent hospital admissions, poor patient outcomes and high costs to the health service. Consequently, effective information exchange is essential. The use of Health Information Systems (HIS) can enhance the exchange of structured clinical information within and among healthcare facilities. However, their use needs to be complemented with structural coordination mechanisms. This research-in-progress paper reports on research currently underway in a UK hospital, where alcohol use disorder is a key healthcare priority. Drawing from the concept of relational coordination as the theoretical lens, we examine the complementary roles of use of HIS by, and relational coordination among, healthcare professionals in facilitating data flow and information exchange between teams within an integrated alcohol care pathway. The study contributes to the growing stream of IS research that focuses on the use of HIS for particular healthcare conditions.*

*Keywords: alcohol use disorder, health information systems, integrated care, relational coordination.*

## 1 Introduction and motivation

Health information systems (HIS), such as electronic health records or health information exchanges, are essential for enhancing process efficiency in the United Kingdom's (UK) National Health Service (NHS). However, despite previous attempts, such as the (failed) National Programme for IT (House of Commons Committee of Public Accounts, 2013), there is no nationally accessible comprehensive HIS in the NHS. Despite progress being made at primary care level, implementation of HIS in hospitals has been disjointed, with a vast array of systems adopted from multiple suppliers, thus leading to a lack of standardisation and interoperability between them.

Hospitals are complex organisations, consisting of numerous different teams with clear demarcations between them based on clinical speciality and medical need (Rushmer, 2005). For superior patient care outcomes and to minimise internal inefficiencies, these teams must work together to provide a coordinated approach to care. However, this does not always happen because the demarcations often act as a barrier to cross-team work and coordination. The UK Department of Health (2000), in its document *The NHS Plan*, blamed failures in NHS service provision in part on the “old-fashioned demarcations between staff and barriers between services.” (DoH, 2000, p.10). A 2011 survey found that 33% of patients in the UK with serious illnesses and injuries or chronic diseases had experienced coordination gaps in their care, such as communication failures between providers or lack of availability

of information relating to medical/test records (Schoen et al., 2011), leading to lower quality patient care.

In an effort to address this, in 2014 the NHS announced an overhaul of its service structure, towards integrated care (NHS, 2014). Integrated care aims to improve care delivery and the patient's experience through coordinating patient care between two or more health and/or social care units (Shaw et al., 2011). A fundamental feature of integration is the exchange of information. Such exchange includes the sharing and transfer of patient data and information across multiple care interfaces to support clinical decision-making, coordination and continuity of care (Leutz, 1999, McDonald et al., 2007).

Care pathways, which map the clinically planned route across different clinical departments and facilities that a patient may expect to follow through the course of their treatment, are necessary for integrated care. They commonly comprise both health and social care. For the pathway to operate effectively, data and information must be exchanged within a hospital and between hospitals and community professionals. This information flow is central to coordination, informed decision-making and continuity of care. HIS have a key potential role to play in this exchange, particularly when patient records are held electronically. However, this is not possible when patient records are held on paper or when HIS in the same or across different hospitals and care facilities are not linked. Where HIS do not allow for effective data sharing and information exchange, complementary mechanisms, such as relational coordination processes, are often employed to facilitate the flow of information between health and social care professionals along the course of a patient's journey.

Alcohol use disorder (AUD) develops as a result of continued alcohol misuse, which costs the NHS approximately £3.5bn annually (National Audit Office, 2014). AUD incorporates alcohol-specific or alcohol-related health conditions in which alcohol plays a causative role (NICE, 2017), for example alcohol withdrawal syndrome or alcohol-related liver disease. In 2016/17, there were approximately 1.1 million alcohol-related hospital admissions in England, accounting for 7% of all hospital admissions in the country (NHS Digital, 2018). AUD is higher in areas of high deprivation and the North West of England has the highest levels in the country (Public Health Blackpool, 2016).

Alcohol use disorder is both a social and a medical issue, and a key public health priority. Alcohol use disorder is associated with multiple physical and psychological comorbidities such as liver disease, cardiovascular disease, cancer and mental health conditions, leading to frequent hospital attendances (NHS Digital, 2018). Consequently, alcohol care requires many different specialisms to work together from across the hospital and the community. Accordingly, alcohol care pathways offer a good context to study integrated care.

This research-in-progress paper examines the use of HIS by health and social care professionals within care pathways for patients with alcohol use disorder and examines how HIS use is complemented by relational coordination. Relational coordination is defined as the relational dynamics of coordination between interdependent pathway teams (Gittell et al., 2010). This paper addresses the well-being theme of the track on Health Information Technology and IS for Healthcare. We adopt an interpretive, qualitative research method, with data comprising semi-structured interviews with clinicians, community support workers and patients. The research reported in this paper aims to address the following research question: ***In care pathways for alcohol use disorder, how do HIS and relational coordination together facilitate the delivery of integrated care?***

This study contributes to the healthcare IS literature by enhancing understanding of how information exchange takes place in care pathways to augment and complement the affordances of HIS. It further has implications for practice through providing insight into best practice and areas of weakness in patient data flows, to enable more effective coordination between practitioners. It draws in an interdisciplinary vein, from the information systems (IS), management and healthcare literatures.

## 2 Literature review

### 2.1 Integrated care

Integration in an organisation is defined as “*the process of achieving unity of effort among the various subsystems in the accomplishment of the organization's task.*” (Lawrence and Lorsch, 1967a, p.4). It requires coordination between various organisational units (Lawrence and Lorsch, 1967b). Integration is particularly important in healthcare where there is differentiation between specialist units and teams (Dobrzykowski and Tarafdar, 2015). Healthcare service design impacts clinical quality and patient outcomes (Ding, 2015). To improve patient outcomes and reduce inefficiencies, integrated care is emerging as a healthcare priority for many developed nations across the world, including the UK. Integrated care involves hospital services moving away from a traditional departmental structure towards a more process-oriented design, focussing on a coordinated and synchronised approach to patient care (Prætorius and Becker, 2016). The aim of integrated care is to improve both care delivery and patient outcomes through coordinating care within and across health and social care settings. It requires the exchange of information across different care interfaces responsible for different aspects of care (McDonald et al., 2007). However, this is often challenging due to the fragmented structure of the NHS (Nasir et al., 2013), where hospital departments or health and care facilities have traditionally worked in silos, thus creating a barrier to collaboration (Hulks et al., 2017). Stemming largely from the fragmented NHS organisational structure, different NHS hospitals have implemented different HIS, leading to lack of system standardisation and interoperability between health and care facilities, and even between different departments within the same hospital. Integrated care aims to address this fragmentation (Shaw et al., 2011).

### 2.2 Alcohol use disorder: The problem of coordination

Alcohol care has the following distinct characteristics. First, patients with AUD often have multiple comorbidities. Alcohol is attributable to numerous health conditions, most commonly liver disease, pancreatitis, cardiovascular disease and cancer, as well as mental health and behaviour disorders such as dependency, anxiety and depression (NHS Digital, 2018). Second, patients often have complex social issues, which impact care delivery, treatment success and patient outcomes. Third, as a result of comorbidities and challenging social circumstances, many patients have frequent relapses resulting in multiple hospital admissions. Furthermore, for patients with more complex health needs, care trajectories are less predictable and non-standard, requiring even greater coordination (Allen et al., 2009, Wodskou et al., 2014). Accordingly, an integrated and coordinated approach to care is required for AUD patients. Traditionally, the delivery of alcohol care has been fragmented between different hospital departments and community organisations leading to communication failures between departments and services, resulting in poor patient outcomes, frequent readmissions and increased costs to the health service (Moriarty, 2011). In 2010, a joint report by the British Society of Gastroenterology, Alcohol Health Alliance UK and the British Association for Study of the Liver was published, recommending a revised approach to alcohol care (Moriarty et al., 2010). Recommendations included the establishment of multidisciplinary alcohol-care teams in hospitals, the creation of integrated alcohol care pathways across the hospital and community organisations, and coordinated policies for detecting and managing AUD in emergency departments and acute medical units (Moriarty, 2010, Williams et al., 2014); all of which require patient data and information exchange. However, existing hospital HIS infrastructure may not support this.

Integrated care pathways for AUD patients involve the delivery of care in the hospital and continuing care in the community following discharge, requiring the transfer of patient data within and between the hospital and community care providers. Developed through dialogue with hospital clinicians, Figure 1 represents the pathway a patient admitted with an AUD may expect to follow, with the red lines indicating data flow and information exchange between teams. Typically, a patient will arrive at

the Accident and Emergency department (A&E) either via ambulance, GP referral or self-referral. Once a patient has been assessed and the presence of AUD has been established, the alcohol liaison (AL) team are notified to attend. A key role of the AL team is to manage the safe withdrawal from alcohol and minimise the risk of withdrawal symptoms progressing, as in certain cases this may be fatal (NICE, 2011). If the patient presents at A&E with AUD symptoms, they may be discharged at this point and referred to the community alcohol service for continuing treatment, or they may be admitted to hospital, usually via the Acute Medical Unit (AMU). The AL team will assess the patient in the A&E department and advise the A&E team on appropriate treatment from an alcohol perspective. Once admitted, the patient is transferred to the Acute Medical Unit (AMU) and when stable is moved onto a ward. Whilst on the AMU and the ward, the patient will be seen daily by the AL team, who will continue to monitor their safe withdrawal, alongside the ward team. Therefore, as the patient progresses through the hospital, their data must be shared between teams in multiple departments. The AL team will then coordinate the patient's referral to community services for continued care following discharge, requiring patient data to be transferred beyond the hospital.

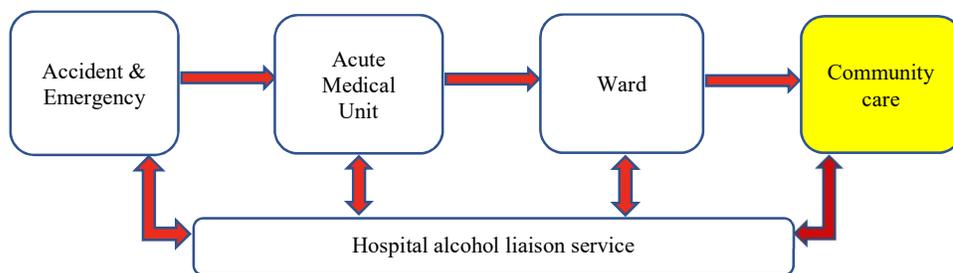


Figure 1. Example of patient progression and data flow in an alcohol care pathway

However, as noted, AUD is attributable to multiple health conditions, the prevalence of which will influence the ward a patient is placed on, or the sequence of medical interventions. This leads to a greater need for patient data and information to be shared amongst the various specialist teams to ensure data is available to the right teams at the right time for informed decision-making. Additionally, due to the nature of alcohol use disorder, patients regularly self-discharge early, repeatedly fail to attend outpatient or community appointments and have frequent relapses, thus increasing the likelihood of readmittance to hospital. If data and information are not effectively shared between teams, patient care may be adversely affected, and the chaotic cycle of patient behaviour continues.

Health information systems (HIS) have the potential to transform healthcare delivery by facilitating information exchange for enhanced care coordination (Agarwal et al., 2010, Ayer, 2018, Davidson et al., 2014, Fichman et al., 2011). HIS provide a platform where patient data can be stored in a standardised format (Bardhan and Thouin, 2012, Wasko and Faraj, 2005); they have the potential to enhance information exchange, for example through the dissemination of test results (Dobrzykowski and Tarafdar, 2015); and improve care delivery by providing access to timely information for informed decision-making (Fichman et al., 2011).

The effectiveness of information exchange can impact a patient's experience (Dobrzykowski and Tarafdar, 2015) and problems in information flow can lead to care coordination gaps, such as errors in diagnosis or medication, resulting in adverse patient outcomes (Schoen et al., 2011, White et al., 2004). Whilst information flow necessary for coordinated care may be supported by HIS, the use of IT alone by healthcare professionals is not sufficient for effective patient information exchange (Dobrzykowski and Tarafdar, 2015). Equally, although information systems play a crucial structural role in integration of care (Strandberg-Larsen and Krasnik, 2009), integration occurs on different levels and the technical

integration of HIS alone is not sufficient for healthcare service integration (Leutz, 2005, Ellingsen and Roed, 2010). This is especially problematic when different systems do not allow for interoperability between them. Thus, other structural mechanisms are needed.

### **2.3 Relational coordination**

Relational coordination is defined as “a mutually reinforcing process of interaction between communication and relationships carried out for the purpose of task integration” (Gittell, 2002, p. 301). It focuses on the interaction between roles and maintains that coordination occurs through frequent, timely, accurate and problem-solving communication, supported by relationships based on shared goals, shared knowledge and mutual respect (Gittell, 2002, 2006, 2011). The concept is particularly relevant for alcohol care because multidisciplinary teams from across the hospital and community must work together to provide tailored patient care, often addressing both medical and social issues, to optimise patient outcomes (e.g. Gittell, et al. 2000, Chesluk and Holmboe, 2010, Tietbohl et al., 2015). Adopting a relational coordination lens enables the impact of those inter-team relationships to be examined (Claggett and Karahanna, 2018). It is especially critical for alcohol care pathways, given the high number of alcohol-related hospital admissions, the frequent lack of engagement by patients, and the timeliness of AUD detection and management. We draw on the theoretical lens of relational coordination to understand how effective information exchange can take place within an integrated alcohol care pathway, in a complementary manner with the use of HIS.

## **3 Methods and data**

We aim to understand “how” relational coordination complements the use of HIS in data flow and information exchange in alcohol care pathways (Yin, 2003). Thus, we adopt an interpretive and qualitative research method. Our empirical site is a large hospital with extensive alcohol care facilities and a large number of AUD patients in the North West of England. Our primary source of data consists of interviews conducted with hospital clinicians, hospital informaticians, community outreach workers and patients in the community. We use the concept of relational coordination (Gittell, 2002) as the sensitising lens for conducting interviews.

The overall research design is to conduct approximately 40 semi-structured interviews with participants from pathway teams. Further interviews may be conducted, depending on progress in participant recruitment and until the point of theoretical saturation. The snowball sampling technique is being used for participant recruitment. Therefore, the participants will comprise 25 clinical members of staff from the hospital (approximately five from each pathway team), including specialist nurses, advanced nurse practitioners, and junior and senior doctors; five clinical and outreach members of staff from the community support agency; and 10 AUD patients that have received hospital care and are now receiving care and support in the community. Ethical approval was granted to the lead author by the UK Health Research Authority prior to interviews taking place.

Hospital-based participants will be asked questions relating to their use of different HIS within the hospital to collect, record and share patient data; their use of paper records to collect and record data; and the processes they engage in to exchange data and additional information with other teams in the pathway – both within and beyond the hospital. Participants from the community support agency will be asked about the referral process used to inform them of a new patient; the data provided at the point of referral and how this is received; and the interaction between the community agency and the hospital for obtaining additional information. Patient participants will be asked questions regarding their experience of how their data was handled by different teams throughout their pathway and their experience of integration and care coordination from a patient perspective. Initial hospital and community contacts were used to aid recruitment through snowball sampling. The lead author

conducted 10 expert interviews and meetings with hospital informaticians, clinicians and community service managers prior to commencing semi-structured interviews, to gain an understanding of the HIS infrastructure in place across the hospital and community service, and the basic functionality and level of interoperability of selected key systems used by pathway teams.

In this research-in-progress paper we report on 10 semi-structured interviews that have taken place to date – eight with hospital clinicians and two with community outreach workers. All were conducted in person at the empirical site by the lead author and each lasted from 30-60 minutes. The interviews were audio recorded and later transcribed. Data analysis through coding and thematic analysis techniques, using NVivo software, is ongoing. Thematic analysis is an appropriate method because it helps to identify repeated patterns or themes within the data, identifying key features through coding to aid interpretation (Braun and Clarke, 2006, Saunders et al., 2016, Clarke and Braun, 2017).

## **4 Preliminary findings and discussion**

Preliminary findings indicate that more than 180 different HIS are in place across the hospital. Further, the community support agency operates an entirely separate system. Thus, lack of synchronisation and interoperability, both within and beyond the hospital, is a key issue. To date, the primary information exchange relationship studied is between the Accident and Emergency (A&E) team and Alcohol Liaison (AL) team. For the majority of alcohol-related A&E department attendances at the empirical site, alcohol withdrawal is the primary reason. Due to the cyclical nature of AUD, the majority of these patients have visited the A&E department previously.

Preliminary findings indicate that HIS use is complemented by relational coordination in the early stages of the pathway. The A&E department operate a patient administrative system (PAS), a stand-alone HIS used only in the A&E department, although the AL team have access. This HIS records real-time data on current A&E department attendances, but does not contain detailed historic treatment data provided beyond the A&E department. The AL team has a different database of all historic treatments they have provided across the hospital, including community referrals. The A&E team do not have access to the AL database and the two systems are not linked. As there is no interoperability, relational coordination in the form of inter-team communication is used to exchange patient data and information. This can happen in a number of ways. Firstly, the A&E team alert the AL team to attend a patient in the A&E department either by telephone or bleep to a pager, and verbally convey current patient data held in the PAS. Based on existing relationships and frequent, timely communication between the two teams, the A&E team understand the key data required by the AL team prior to seeing a patient. Importantly, in line with relational coordination, this verbal communication provides an opportunity for the A&E team to provide problem-solving information by conveying additional, non-medical information that the A&E team feel may be of interest to the AL team, for example a patient's emotional state or their living arrangements. Secondly, as most alcohol patients at the hospital are repeat admissions, once notified of a patient's arrival, the AL team provide the A&E team with historic patient treatment data for more informed decision-making, either at the time of the call or when the AL team arrive at the A&E department. This is a reactive process. However, thirdly, when office-based the AL team regularly check the A&E system for patients known to them and proactively communicate the historic patient data to the A&E team or go direct to the A&E department to liaise with the A&E team and assess the patient prior to being alerted. This form of timely, problem-solving communication provides accurate information to the A&E team for informed decision-making and is an example of relational coordination based on the shared goals, shared knowledge and mutual respect between the A&E and AL teams (Gittell, 2011).

Further, at this stage there is uncertainty in the PAS data recorded by the A&E team regarding current levels of alcohol consumption. Whether through fear of being judged or embarrassment linked to the

social stigma of the condition, alcohol patients don't always provide accurate information regarding their current drinking habits to the A&E team on arrival at the A&E department. To overcome this uncertainty, the AL team regularly repeat the patient's alcohol assessment in the A&E department as, through experience, the AL team find patients to be more honest with them as they have an existing relationship, therefore patients feel more comfortable disclosing such details. The AL team then communicate the historic and new information to the A&E team, who input the data into their PAS. This data is then accessible across the A&E department.

Figure 2 demonstrates a patient's early progression through the pathway and the role of HIS and relational coordination in data flow and information exchange. The thin blue lines demonstrate pathway progression, the red line demonstrates the relational coordination processes between the A&E and AL teams, the thick blue lines indicate HIS supported data access and information exchange, and the dashed blue lines indicate the gaps in HIS supported exchange that require teams to engage in relational coordination processes.

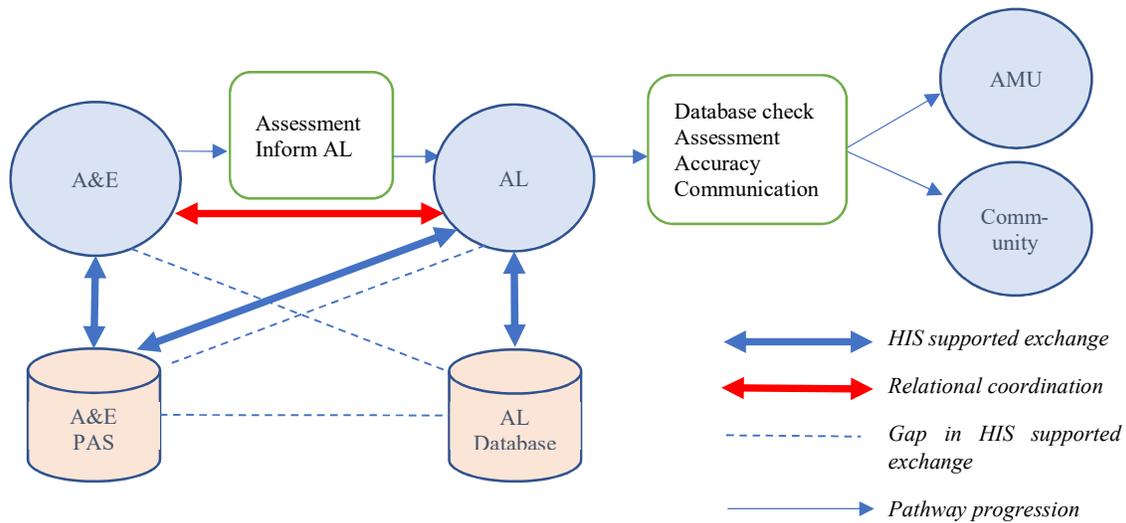


Figure 2. Early stage pathway progression and data collection process for AUD patients

In line with the three dimensions of relationships central to relational coordination (Gittell, 2011), the A&E and AL teams share common goals regarding patient care; share the knowledge that patients may not provide reliable answers; and have mutual respect through an understanding of each other's roles and the criticality of timely withdrawal management. Consequently, the A&E and AL teams engage in frequent, timely, accurate and problem-solving communication to ensure effective data and information exchange. In summary, HIS are used for recording patient data and disseminating data to other teams. However, particularly due to uncertainty in the reliability of information held in the HIS and lack of interoperability between systems, staff engage in vital relational coordination practices to address this uncertainty for the purpose of informed decision-making and quality patient care.

## 5 Contributions to theory and implications for practice

Within the management and healthcare literatures, relational coordination theory has been adopted as a sensitising lens to studies in the healthcare domain (Gittell, et al. 2000, Gittell, 2002, Chesluk and Holmboe, 2010, Havens et al., 2010, Tietbohl et al., 2015). However, to the best of our knowledge, this is one of the first studies to examine the interplay of HIS and relational coordination. If information exchange necessary for supporting healthcare delivery is not fully supported by HIS, in the drive

towards integrated care, it is important to understand more about the complementary processes that augment HIS and facilitate patient data and information flow between various health and social care interfaces. This study will contribute to the healthcare IS literature by enhancing understanding of how information exchange takes place in care pathways to augment and complement the affordances of HIS. It will further enhance understanding of the complementarity of relational coordination to electronic data flow and information exchange. From a theoretical perspective, the study will contribute to the body of literature on relational coordination theory (Gittell, 2002). The study further contributes to the growing stream of IS research that focuses on the use of HIS for particular healthcare conditions. Finally, the study will also contribute to the coordination literature through enhancing understanding of the heterogeneous coordination processes used to facilitate data flow and information exchange in the healthcare domain.

This study will also have implications for practice by providing pointers for best practices with regard to improved coordination between teams within a single healthcare facility, and between health and social care providers.

## **6 Ongoing steps**

The research is ongoing and we are working to the research design outlined in this paper. Our next steps will be to interview clinical participants from other departments within the alcohol care pathway and AUD patients recovering in the community, who have received hospital care at the empirical site. The preliminary findings discussed above indicate a lack of interoperability between HIS and uncertainty in some of the data that necessitate the use of relational coordination by teams to ensure data is available for informed clinical decision-making. Going forward, the study will further investigate these and other themes to understand whether such uncertainty is present throughout the pathway and the role of relational coordination as a complementary mechanism to aid information exchange that supports clinical decision-making.

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