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# A paradox theory perspective on HIT's impact on continuity of care

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# A Paradox Theory Perspective on HIT's Impact on Continuity of Care

*Completed Research Paper*

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## Abstract

*Regulators of healthcare systems continue to investigate ways to improve continuity of care (COC) for patients given its inherent fragmented nature. Integrated healthcare information technology (HIT) system is touted as one of the ways to improve COC. Yet, studies show that there are still challenges in achieving effective COC even when supported by integrated HIT. These persistent challenges are likely due to deep-seated tensions among the various parts of the healthcare system that are involved in providing care. Drawing on HIT impact literature and paradox theory, we study the implementation of an integrated electronic medical record (EMR) system aimed at improving COC for the specialist referrals process in a hospital cluster. We found that while the system had positive impacts on some aspects of the COC, we uncover two types of paradoxical tensions occurring in this healthcare context that interfered with those positive impacts and contributed to ongoing COC challenges.*

**Keywords:** Continuity of care, Healthcare IT, HIT impact, EMR system, paradoxical tensions, performance tension, learning tension

## Introduction

Most healthcare systems are highly fragmented as patients depend on many physicians and specialists to manage their diverse medical needs. This fragmented system of care is problematic as it may lead to incomplete medication information, delays in the detection of severe illness, or complications in the management of chronic conditions (Haggerty et al. 2008; Pinsonneault et al. 2017). As such, there is a concerted global effort to improve the continuity of care (COC) for patients (Haggerty et al. 2003). Yet, achieving COC – especially when managed across multiple health organizations – continues to be challenging. Two key issues that have been raised in the past were the complex coordination and uneven flow of patient information. Information systems (IS) and medical informatics research have studied the use of integrated healthcare IT (HIT) systems, such as electronic medical records (EMR) systems and clinical decision support systems (CDSS), to mitigate and even resolve these two issues (Pinsonneault et al. 2017).

However, even though integrated HIT systems are implemented in various healthcare organizations, IS and healthcare researchers have found that there are still many challenges in achieving effective and seamless COC (Coleman 2003; Lim et al. 2015; Mehrotra et al. 2011). Some of these challenges are due to the problems of embedding HIT systems in various organizational processes and the unique working conditions of clinical work (McCullough et al. 2016). More importantly, there is growing evidence that some of these post-HIT challenges are due to deep-seated issues surfaced after implementing HIT systems for COC (Lim et al. 2015; Rudkjobing et al. 2012).

Our research question thus is "Why is effective COC hard to achieve across different healthcare organizations after implementing an integrated HIT system?" In our study, we focus on one critical

component of COC in the ambulatory care context, i.e., the specialist referral process and the use of an integrated EMR system to support this process. We conducted a longitudinal case study of the implementation of an integrated EMR system within a hospital cluster made up of a government hospital with specialist clinics and several community clinics. While the implementation of the integrated EMR system was successful, its impact on the specialist referral process was equivocal as there were not much significant improvements on patient referrals. Our findings show the integrated EMR system was able to improve the informational and management aspects of COC as per existing literature. However, there were also several deep-seated challenges that undermined the integrated EMR system's impact. We then apply paradox theory to understand what these challenges were and why they limited the integrated EMR system's positive impacts.

# Literature Review

## *Positive Impacts of HIT on COC in the Specialist Referral Process*

Formally, COC is defined as "the degree to which a series of discrete healthcare events is experienced as coherent and connected and consistent with the patient's medical needs and personal context (Haggerty et al. 2003, p.g. 1221)." COC is important because it allows different providers to deliver individualised and consistent care to patients over time (Devine et al. 2010; Tamblyn et al. 2008). Healthcare research shows that a high level of COC can mitigate the fragmented and decentralized care system by reducing the risk of complications (Malcolm et al. 2013), improving preventive care (Atlas et al. 2009; Cabana and Jee 2004), increasing patient satisfaction (Weiss and Blustein 1996) and compliance (Chen et al. 2013; Hong and Kang 2013). From a healthcare system perspective, COC can also manage the transition and right siting of care and thus decrease emergency and inpatient medical services and care costs (Hussey et al. 2014; Kim et al. 2006; Mainous and Gill 1998; Parchman et al. 2002; Sharma et al. 2010; Wasson et al. 1984).

Given the highly fragmented nature of healthcare delivery in many healthcare systems, healthcare providers and regulatory bodies have placed an increased emphasis on enhancing COC, especially through use of HIT systems (Haggerty et al. 2008; Pinsonneault et al. 2017). HIT is defined as "an information system including all computer-based components which are used by healthcare professionals or the patients themselves in the context of inpatient or outpatient patient care to process patient-related data, information, or knowledge" (Pinsonneault et al. 2017, p. 459). Prior IS research has examined the role of HIT in enabling COC, utilizing the conceptualization of COC in terms of informational, management, and relational continuity (Haggerty et al. 2008; Pinsonneault et al. 2017). Informational continuity refers to having access to a patient's information from previous health events to ensure that the current care provided is appropriate (Haggerty et al., 2003). Such information does not just include disease and patient information but also patient specific knowledge, e.g., their preferences, values, and context. Management continuity refers to providing a consistent and responsive approach in managing a patient's condition by clinicians from different organizations (Haggerty et al., 2003). Relational continuity refers to providing therapeutic relationships between patients and their different clinicians (Haggerty et al., 2003).

Specifically, we focus on COC in the specialist referral process as it is a major care transition event and is consistently a major source of frustration among family physicians and specialists (Mehrotra et al. 2011). Both medical informatics and IS studies consider HIT to be an important tool in improving informational continuity within the specialist referral context (Mehrotra et al. 2011; Stille et al. 2006). Information continuity in the specialist referral context involves the transfer of "facts" (e.g., earlier tests, list of medications, and reason for consultation). Specialists complain they are not always sure why a patient was referred or that critical elements of the care plan were not communicated (Coleman 2003; McPhee et al. 1984) while family physicians bemoan that specialists often do not provide sufficient feedback information (Byrd and Moskowitz 1987; Williams et al. 2005). HIT can directly improve this situation for specialist referrals. For example, Stille et al. (2006) found a significant increase in communication when family physicians and specialists share an EMR system. In another study, the use of centralised systems that automatically download patient data and update clinical progress notes for various clinicians helped to improve team communication involving patient handovers, which positively impacted the continuity of care (Van Eaton et al. 2005).

Besides informational continuity, HIT can also positively impact the referral's management continuity (a coherent approach to patient management where both referring physician and specialist are 'on the same page' ) and relational continuity (developing patient-provider trust necessary in a therapeutic relationship) (Mehrotra et al. 2011). Pinsonneault et al. (2017) study on the use of integrated HIT across family physicians and hospital-based physicians found that HIT afforded informational continuity as a first-order effect and subsequently positively impacted management and relational continuity as second-order effects.

### *Ongoing COC Challenges after HIT Implementation*

While studies provide some support for HIT's ability to positively impact informational continuity and possibly management and relational continuity for specialist referrals, other studies suggest there are ongoing COC challenges after HIT is implemented. One immediate challenge to COC is with respect to how well HIT use is integrated with the respective medical units' work. Some suggest that HIT's impact on informational continuity in the specialist referral process may be mixed if the HIT is not well integrated or if the processes across the organizations are not changed to complement the HIT's capabilities (Buntin et al. 2011; Welch et al. 2007). In IS research, Lim et al. (2015) observed that physicians working in a care transition context do not benefit from informational continuity via HIT when the systems are not fully interoperable or if the dissemination of information is not correctly directed to the right personnel. Thus from an IS perspective, the inter-organizational HIT system needs to be well-integrated and complemented with a comprehensive use of functionalities and process changes so that the HIT is able to support the diverse work of different physicians across organizations (McCullough et al. 2016).

There is evidence of another type of COC challenge that is not as obvious as they are linked to deep-seated issues, which undermine HIT's positive impacts on COC. For example, Rudkjobing et al. (2012)) analysis of the Danish integrated care system reveals that the way tasks and financial incentives are structured among family physicians and hospitals undermined a better coordination of patient care. Another set of deep-seated issues that challenge the impact of HIT on COC are the working conditions and other institutional aspects of the specialist referral process. For example, due to the high workload and time pressures faced by referring physicians, nearly 25 to 50% of referring family physicians report that they do not know whether their patients manage to obtain specialist appointments or actually attended their specialist appointments (Bourguet et al. 1998; Byrd and Moskowitz 1987). Such poor referral tracking practices can thus lead to more ineffective referrals (e.g., repeat referrals). Moreover, many family physician referrals may be non-repeated events and as such, there continues to be a lack of communication and/or limited interactions among referring family physicians and specialists (Lim et al. 2015). Finally, the payment systems imposed by healthcare regulatory bodies or insurance companies may obstruct changes that could improve COC. Mehrotra et al. (2011)) reported that the use of the e-referral system to triage and screen referrals, while effective in preventing unnecessary referrals, is not likely to be implemented because US healthcare insurance companies do not pay specialists unless they physically see the patient.

In summary, while the literature clearly explains how COC is vital to improving quality of care for patients and how HIT can be used to improve COC especially in the specialist referral process, our review also shows that there are other challenges that seem to persist. These persistent challenges are likely due to deep-seated tensions arising from competing demands among the various parts of the healthcare system that are involved in providing care. We therefore turn to Paradox Theory to help us to more systematically consider what these challenges are and why they occur.

## *Paradox Theory (PT)*

Prior IS research has noted that competing demands can undermine the expected benefits of information systems. In the broader area of digital transformation, studies have noted that these competing demands could arise for example from a clash of institutional logics across professional groups and organizational norms (Thorén et al. 2018), and differences across customer segments, work modes and priorities (Wiener et al. 2018). In the healthcare context, a more recent study of IT implementation in healthcare also found that competing demands between nursing home nurses' vs acute hospital specialists' processes and priorities (Agarwal et al. 2022). This and other IS studies in the healthcare context have suggested that these competing demands may be conceptualized as paradoxical tensions (Singh et al. 2009; Standing et al. 2018). Paradox Theory provides a way to identify underlying tensions arising from or competing

demands that will undermine the hoped for benefits from information systems, if left unidentified and unaddressed.

Paradoxical tension is defined as elements that seem logical individually but inconsistent and even absurd when juxtaposed (Smith and Lewis 2011). Paradoxes remain latent in organizations, and become salient when contextual conditions highlight the contradictory nature of their dualities (Smith and Lewis 2011). These contextual conditions or triggers include plurality, change, and scarcity (Hargrave and Van de Ven 2017; Jarzabkowski et al. 2013; Smith 2014; Smith and Lewis 2011). These triggers often occur in information systems implementation, as in the case of HIT. The HIT implementation is itself a major change event. Change spurs new opportunities for sensemaking, and can trigger tensions as actors struggle with conflicting short- and long-term needs (Lüscher & Lewis 2008), and with competing yet coexisting roles (Huy 2002). Plurality is prevalent in all organizations and cross-organizational contexts (as is often the case in healthcare systems), where there are diverse views and distributed power (Denis et al. 2007); plurality can trigger tensions arising from, for example, competing goals (Cohen and March 1974). Scarcity involves resource constraints, and can trigger tensions as actors' conflicting priorities compete for financial, human, and other resources (Smith and Lewis 2011).

PT provides a robust categorization of four types of tensions—performing, learning, organizing, and belonging (Smith & Lewis, 2011). Performing tensions arise from competing goals that different stakeholder groups have (Smith & Lewis, 2011). In the context of our study, it is likely that specialists and community clinics would have differing goals, and the paradox perspective's explicit recognition of performing tensions leads us to consider these different goals and how this may impact the effectiveness of COC, especially with regard to referrals. Learning tension reflects the contradictions between past and future knowledge, as well as radical versus incremental improvements (Smith & Lewis, 2011). Learning tensions emerge as dynamic systems change, and organizational employees are required to acquire different competencies. Despite the improvement in information flow, differences in knowledge and competence between specialists and community doctors may continue. This resonates with Lim et al.'s (2015) findings on the different epistemic communities involved in the transition of care. Organizing tension reflects competing policies and processes deployed to achieve goals across organizational units (Smith & Lewis, 2011). When new systems are implemented, organizing tension often arises between existing and new policies and processes. The paradoxical tension perspective further highlights the aspect of conflict between existing processes found in the specialist clinics and the community clinics. Belonging tension is defined as the need to both maintain individual identity and identify and be homogeneous with a collective (Smith & Lewis, 2011). Family physicians and specialists identify primarily with different communities – the former tend to be part of smaller, decentralized community clinics, while the latter are part of large acute care hospitals. Belonging tensions may arise if these groups are required to identify with an integrated entity for the purposes of COC.

# Methods

## *Research Design*

As our research question aims to understand why healthcare organizations face challenges in leveraging HIT to improve continuity of care for patients across community and specialist clinics, we conducted an, in-depth case study (Yin 2009). We selected this particular case to study for several key reasons (details of the case are provided below). First, this case study provided a unique context where specialist care and community care were provided by different organizations, albeit these organizations belong to the same overarching hospital cluster. Second, this was an integration project focused on a new IT platform – an integrated EMR system that would replace the different existing EMR platforms used in the community clinics, so as to link them to the specialist clinics in the hospital. The overall goal of the project led us to our research question. Finally, we were invited to be co-investigators of this project and to understand the impact of the integrated EMR on the efficiency and effectiveness of referrals. As such, we were able to gain direct access to the project from its beginning. This gave the authors privileged perspective to the entire process of the project, as well as access to various stakeholders involved in the design and implementation of the new EMR system and the integration of care between the community and specialist clinics through the referral process. This access enabled us to uncover the reasons for the paradoxical tensions surrounding the use of the integrated EMR for referrals.

## *Case Study Background – Existing COC Challenges in Specialist Referrals*

The case study takes place in Singapore and involves a HIT project with two main stakeholders: the 700-bed government hospital where the specialist clinics were located, and the community clinics who belong to the same hospital cluster as the government hospital. Specifically, the community clinics comprise seven clinics and they provide primary care treatment for acute illnesses, management of chronic diseases, women and child health, and dental services in the western part of Singapore.

Our study is focused on the specialist referral process for patients occurring among these clinics. On the one hand, many specialist referrals originate from community clinics – where the family physician refers the patient to a specialist in the hospital's specialist clinic. On the other hand, there are some patients who are referred by specialist clinicians to the community clinics – to follow-up on regular tests, wound dressing, or other forms of step-down care that do not require the specialist's services.

To have in-depth understanding of the specialist referral process, our study selected three specific specialist clinics – Orthopaedic, Ophthalmology, and Cardiology – who had the highest number of referrals from the community clinics. Likewise, we selected three community clinics – Jurong, Pioneer, and Choa Chu Kang – that sent the highest number of specialist referrals to the government hospital's specialist clinics. In addition, we also focused on hospital units that supported the referral process – namely the call center unit that managed and coordinated the referrals from the community clinics. Thus, our data collection and case study are focused on these three specialist clinics, the call center unit and three community clinics.

As discussed earlier, coordination of referrals is a key aspect of COC in the specialist referral process. (See Appendix figure for flowchart of the specialist referral process). There were several existing COC challenges faced by this process prior to the EMR implementation. First, both specialists and family physicians complained about information flow issues in the specialist referral process. Before the new EMR system was implemented, the specialists complained that they often did not have access to the patient's electronic referral and will have to ask the patients for the printed referral forms. At the same time, many specialists complained that the referral notes were not very helpful in their clinical examinations as they found the notes too general or do not contain relevant information concerning the patient's conditions that relates to the specialists' work (e.g., they complained that family physicians only list the symptoms but not any diagnosis). Also, in some cases, the specialists complained that critical test information such as x-rays and tests results were not found in the referral or that the quality of the tests were not sufficient for their use (e.g., orthopaedic specialists complained that the spinal x-rays only had two views instead of four that were required). This resulted in additional tests and x-rays that had to be ordered when the patient is being attended to in the specialist's clinic. For the referring family physicians, they observed that they did not know whether their patients went for the specialists' appointments and or what happened to them under the specialists' care – they had no visibility regarding which specialist took over the care of their patient. They may only get to know this if and when their patients return to them for consultation on the same issues or for other treatments. Finally, some specialists also perceived that there were many specialist referrals whose urgency levels were inappropriately classified as direct access (whereby a specialist referral must be made within 2 weeks) when they could be classified as routine (where the referral can be made within 3 months). In some other cases, specialists also noted that some family physicians' referrals classified the patient's condition under the wrong sub-specialty.

Second, as one can observe from the flowchart of the referral process (see Appendix), another challenge was that the administrative and coordination processes of patient-specialist appointments was very manual, inefficient, and cumbersome. Given that many patient referrals may require clarifications by either the family physicians or specialists, the different teams (referral coordinators at the community clinic and the call center team at the hospital) had to engage in many emails and calls back and forth. This led to many patients either having appointments made at a much later date or changing their appointments to other hospitals. Third, as reported by the specialists and Specialist Clinics' operations team, there was usually a high demand for direct access appointments (highest urgency level – as they need to be scheduled within two weeks) that often exceeded the availability of specialist appointment slots. As a result, managing direct access referrals is the main focus for both the community clinics' referral coordinators and call center staff's daily work. For the referral coordinators, their main job is to ensure that their patients had their

appointments secured based on the referral's urgency level. For the call center, it is to ensure that all direct access requests are either met, or to escalate those that cannot be met to the specialist clinic's managers.

## *Data Collection*

For our case study, we collected in-depth interview data and archival data. We collected the in-depth interview data in two phases – the first phase was the pre-implementation of the EMR system in the community clinics and the second phase was the post-implementation of the EMR system (approximately three to five months post go-live). The data collection period (interviews) for the Pre-Go Live phase was from July 30, 2020 to November 9, 2020. For the Post-Go Live phase, it was from March 16, 2021 to July 28, 2021. During the Pre-Go Live phase, we interviewed 21 staff (doctors, nurses, managers, and administrative staff) from the specialist clinics and the call center, as well as 19 staff from the community clinics and their corresponding referral teams. For the Post-Go Live phase, 15 staff were interviewed from the specialist clinics and the call center, and 15 staff from the community clinics and referral team. Overall, 70 interviews were conducted. See Table 1 for the breakdown of the interviews by phase, location, and roles.

Each interview lasted between 30 minutes to an hour. We used a basic interview protocol (available on request) but allowed the interviewee to guide us based on what they felt was more salient in their experience. There were usually two interviewers present for the interview – one conducted the interview while the other took notes. Most of the interviews had audio recordings and were transcribed after each interview. Some of the early ones were not recorded directly due to logistical issues. For those that were not recorded, we had written copious notes. Finally, to triangulate the interview data, we also collected archival data – meeting minutes, presentations, and workshop materials as part of the project documentation. Our archival collection consisted of 52 pages of documents and 142 slides.

| | Number of Interviews<br>Pre EMR implementation | Number of Interviews<br>Post EMR implementation |
|---|---|---|
| Hospital/Specialist Clinics | | |
| Specialists (and specialist nurse) | 16 | 9 |
| Clinic Manager | 1 | 2 |
| Call Center Admin Staff | 4 | 4 |
| Subtotal | 21 | 15 |
| Community Clinics | | |
| Family Physicians | 8 | 6 |
| Manager | 3 | 3 |
| Referral Admin Staff | 8 | 6 |
| Subtotal | 19 | 15 |
| Total | 40 | 30 |

**Table 1. Number of Interviews by Roles and Organization (Pre and Post EMR implementation)**

## *Data Analysis*

Our methodological stance is a positivist case study that aims towards inductive theory building (Sarker et al. 2018). We draw mainly on Eisenhardt (1989) and Miles and Huberman (1994) for how we examined and analysed our data. Our data analysis is focused mainly on the interview data while drawing on the archival data to triangulate our findings. This was an iterative and incremental process. First, we developed case backgrounds for the specialist clinics and the community clinics using the archival and interview data. Next, we read through the interviews to construct an understanding of the specialist referral process and documented it as a narrative write-up. We arranged the data by each community clinic and each of the specialist clinics to compare and contrast each clinic's workflow regarding the specialist referral process. This was vetted by the key stakeholders to ensure that our documentation was valid. Next, we reviewed extant literature on the integrated EMR's impact on specialist referral processes and COC, and considered how our case study challenged or matched existing research findings. We first analyzed that at the

individual clinic level where we compared and contrasted their process and interview findings; we noted that the processes across different clinics of the same category (community or specialist) were mostly similar with minor local idiosyncrasies (e.g., some used paper memos to communicate while others used email). We then decided to aggregate the data analysis to the categories of "community clinic" and "specialist clinic".

While analysing the data using the COC perspective, we realize that there were differences in how COC in the referral process and challenges were experienced in the specialist and community clinics. We based our initial coding on current literature on COC and HIT research. We coded the challenges experienced prior to and after the EMR implementation by their roles (examples include "lack of shared understanding" and "time pressures"), challenges post-EMR implementation (examples include "information overload", "increase in workload"), and changes due to the use of the new EMR (examples include "access to patient schedule" and "access to patient notes across unit"). We iterated between this set of initial coding and the literature on HIT's impact on COC and observed that the changes addressed some of the prior challenges and led to positive impacts on informational and management continuity. However, we noted that there were some referral challenges that persisted after the EMR was implemented (for example specialist clinics were still unable to provide some referral appointments based on the requested urgency threshold).

At this point, we followed the principle of constant comparison between theory and data (Eisenhardt 1989). Given that there are IS studies that looked at persistent tensions in IS implementation, we expanded our coding to include concepts from the PT literature. We were sensitized to how persistent challenges are linked to underlying opposing forces or demands. Key codes for these opposing demands and example quote includes: a) satisfying referral patients' needs – in a situation where family physicians had to provide referrals based on patient requests; an example quote is "*The patient request(ed) that (he) wants to see specialist, even if (community clinic) doctor doesn't think it's necessary.*" B) Optimal allocation of specialist care – in a situation where specialist clinics struggled to efficiently manage specialist appointments; an example quote is "*Specialist clinics like cardiology have a long wait time for appointments and many times, urgent referrals may not have an appointment date within the two weeks' threshold*". C) Generalist doctors' assessment – problems with the family doctor's assessment of the patient's condition and their decision on urgency and/or type of specialty referral; an example quote is "*Sometimes the referral letter may want us to see the patient urgently. They may key in that it's retinal glaucoma when it's not.*" D) Specialists' assessment – ability for family physicians to align their assessment with the specialists' assessment criteria; an example quote is "*(for eye problems), it is a bit difficult as all we do is look at the patient. We don't really have the equipment and specialty to examine the patient*". We reflected on how these matched to different types of paradoxical tensions and found two that were applicable: Performing and Learning tensions, including their triggers. Specifically, we matched "Satisfying Referral Patients' Needs vs. Optimal Allocation of Specialist Care" to Performing tension and we matched "Generalist Doctors' Assessment vs. Specialists' Assessment" to Learning Tension. We noted that the other two tensions – Organizing and Belonging – were not salient in the data, although we were sensitized to consider why this may be the case. We combined these coding iterations to develop the two key theoretical themes (i.e., the positive impact of HIT on informational and management continuity and persistent COC challenges post-HIT implementation due to performing and learning tensions).

# Findings

Drawing on PT and case study data, we first present the ways the integrated EMR helped improve informational continuity and management continuity – and the overall COC – in the specialist referral process. We show how the integrated EMR addressed some of the COC challenges experienced prior to the EMR implementation. Next, we discuss how some COC challenges persisted post-EMR implementation. We discuss how these persistent challenges are linked to paradoxical tensions that are salient in this context.

## *Integrated EMR's Impact on Informational and Management Continuity*

### Integrated EMR's Positive Impact on Informational Continuity

In line with existing literature, the new integrated EMR system had a positive impact on the informational continuity among the community and specialist clinics. Family physicians now had access to the patient's

complete clinical notes, medication list, and lab works – both for tests conducted in the community clinic and in the hospital. The family physicians reflected that this assisted them in managing the patient when they presented at their clinic, as they often found it difficult to determine the patient's conditions with respect to specific specialties (e.g., orthopaedics). Moreover, having access to the specialist notes also made it easier for the family physician to follow-up on their referred patient's status. By reading the specialists' notes, family physicians also believed that they could gain further clarity and insights on the patient's condition. The EMR's positive impact on informational continuity was also experienced among the referral coordinators, call center team, and specialist clinic operations. The family physicians' referrals are directly entered in the same EMR system, as such, the call center team no longer had to download and convert the referrals in order for the referrals to be seen in their EMR system. The community clinic referral coordinators could also directly check the EMR referrals to see which one to follow up on.

However, family physicians experienced teething problems such severe information overload when they went into the patient's clinical notes (e.g., being overwhelmed by clinical notes from all hospital encounters that are recorded in the patient file). They were later resolved as family physicians began to be more familiar with the systems and use of workarounds. In sum, the positive impacts on informational and management continuity as a whole outweighed some of these negative experiences.

**Integrated EMR's Positive Impact on Management Continuity**

Our findings show that the EMR had positive impact on management continuity, albeit this occurring in conjunction with process changes and the use of additional EMR functionalities as shown in other IS studies (e.g., McCullough et al. 2016). First, the integrated EMR system enabled a new clinical process for the specialists – the direct referral of patients from the hospital and clinics to the community clinics – that led to greater management continuity. Before the EMR was implemented, most specialists did not directly refer their patients back to the community clinics. Presently, the specialist clinic operations team and the specialists/doctors in the hospital could directly order a referral in the EMR system to the community clinics so that their patients can be properly cared for in a step-down care environment. Examples of such referrals include wound care or stitch removals after a surgery or to perform regular check-ups (for eye care). In this way, the new EMR system and process enabled improved management continuity for patients who were discharged from the hospital and the specialist clinics.

Second, the EMR together with new processes and policies improved the previously inefficient coordination of referrals between community clinics and specialist clinics, which in turn improved management continuity. After the new EMR system was implemented, all three groups (the community clinic's referral coordinators, the hospital's call center and Specialist Clinic's operations team) used the same EMR referral workqueue function as part of their referral processes. As a result, the call center team could review each referral based on the shared workqueue in the EMR system and schedule the patient's appointment in a seamless manner. Thus if there were cases that required clarifications or had to be rejected, the call center staff no longer used email or phone calls to communicate with the community clinic referral coordinator and their own specialist clinic operations team. They could also use the EMR system to assign the patient referral to the relevant community clinic or specialist clinic workqueue. Furthermore, the EMR referral function has a dedicated memo and documentation screen where the different teams could enter all their queries and clarifications – for example, the call center or referral coordinators could enter their queries into this memo and documentation screen, or if the Specialist Clinics operations team have any specific clarifications, they can directly communicate with the referral coordinators through the memo function. In addition, since all referrals are located in the same EMR system, the Specialist Clinics' operations team changed their processes so that they would handle all the direct access referral requests. In this revised process, the call center team would check if the referral is a direct access request and if so, they would simply assign it to the Specialist Clinics operations team's workqueue.

By leveraging on a comprehensive use of the integrated EMR functionalities and implementing appropriate process changes to closely coordinate the processes of the call center team with the community clinics' referral coordinators, as well as their own specialist clinics, both the community and specialist clinics experienced improvement in management continuity. As noted by the call center manager: "*On average, previously my staff could only do around 60 to 65 (referrals) per day on an eight-hour basis. But now (after the integrated EMR system), we can do around 80 to 90 (referrals) per day for each staff.*" Similarly,

the community clinics' referral coordinators commented that their patient referral work is now better organized and that the coordination of patient appointments and queries was much improved.

## *Persistent COC Challenges Post-Integrated EMR Implementation*

### Satisfying Referral Patients' Needs vs. Optimal Allocation of Specialist Care

One of the persistent COC challenges after the integrated EMR implementation was the problem of the specialist clinics' ability to provide sufficient appointments to urgent referrals from the community clinics. This management continuity challenge was due to issues at both the community clinics and the specialist clinics. On the community clinics' end, family physicians frequently have to satisfy their patients' requests for specialist referrals as part of their scope of care. As a family physician explains: "*The patient request(ed) that (he) wants to see specialist, even if (the community clinic) doctor doesn't think it's necessary*." (CCK Clinic_Dr Z). Physicians acknowledge that this issue arises partly due to the existing healthcare policy on specialist care subsidies, where patients with the community clinic's referral are charged subsidized specialist fees at the government specialist clinics. As a specialist physician reflects: "*To be honest the patient wants a subsidy, that's why they go through the (community clinic) referral*." (Ortho Specialist Dr J). As a result, post-EMR implementation, family physicians continue to order a high number of specialist referrals based on their patients' requests, even when some cases do not necessarily warrant specialist care.

On the specialist clinics' end, they face the problem of managing access and specialist appointments for urgent referrals given that the number of specialists available and their working hours are fixed in the short and medium term. A call center staff explains: "*Specialist clinics like cardiology have a long wait time for appointments and many times, urgent referrals may not have an appointment date that is within the two weeks' threshold*." All the specialist clinics managers reported that the overall load of their clinics continue to be high after the EMR implementation and that the high volume of community clinic referrals inadvertently contribute to the long wait time for specialist appointments. As one specialist clinic manager reflected: "*I don't see a change, because (the community clinics) are still making the same type of referrals. …, we still see similar situations, where (the referrals) may not necessarily be that urgent but are given an urgent appointment – that does still happen*."

From a PT perspective, this persistent COC challenge appears to be a type of performing tension caused by two competing goals – the community clinic's need to meet patient demand for subsidized specialist care versus the specialist clinics' need to optimally allocate limited specialist appointments. It is a performing tension that directly affects COC since the family physicians' goal of meeting their patients' referral requests is in direct conflict with the specialist clinic manager's goal of allocating limited specialist appointment slots in the "best" possible manner. Ironically, because the integrated EMR is able to improve the level of coordination and flow of information through integrated processes, it exacerbates the scarcity of specialist resources by potentially increasing the volume of community clinic referrals. This in turn leads to ongoing performing tensions for both the family physicians, their patients, and the specialist clinics' team of managers and clinicians. Thus in this situation, despite having the integrated EMR, the challenges caused by this tension persisted.

### Generalist Doctors' Assessment vs. Specialists' Assessment

The other COC challenge involving informational and management continuity was the number of inappropriate referrals sent from the community clinics that persisted after the EMR implementation. Specialists explained that inappropriate referrals referred to situations where either some family physicians referred patients to a wrong sub-specialty (e.g., sending to the orthopaedic hip specialist instead of spine specialist), overestimate the urgency of the patient's conditions (e.g., requesting for direct access appointments when it could be a routine appointment), or when family physicians made referrals for minor complaints (e.g., floaters or dry eyes) which could have been managed at the community clinics.

From the specialists' perspective, they attributed this issue to the family physician's existing knowledge base, competence, and lack of access to specialized tools. For example, specialists noted that family physicians may lack the experience and specialized tools in diagnosing very specific complaints (e.g., locating the source of pain in the back or diagnosing eye conditions) and training in managing specific

conditions. In another case, a cardiologist noted that family physicians did not capture or read the patient's test results accurately, which led to wrong classifications (e.g., ECG results taken at the point of examination are inaccurate). He said: *"Some family physicians ticked on all the symptoms in the checklist but these symptoms were not present when I examined the patients."* In other words, specialists believe that the family physicians may need to acquire competencies that specialists currently have and use in their assessment of the referred patients.

From the family physicians' point of view, they understood why they should align their assessment with the specialists' assessment. Some of the senior family physicians commented that over time and with training, they were able to better assess the referrals and reduce the number of inappropriately referred cases. In fact, there have been attempts to do so through the introduction of referral guidelines, occasional training provided by the specialists, or through on the job learning (e.g., taking note of the clarification requests sent by the specialists on some of those inappropriate referrals). But family physicians reported that their medical training is focused on the whole-person and hence their knowledge spans an entire spectrum of disease rather than just one specialty. Thus as a family physician, they will have to manage multiple complaints from a patient. As another family physician explained: "*The problem with primary care is that the patient does not come just for one condition, but several (such as shoulder, back, other pains). In the initial presentation, it is difficult to determine what kind of trauma or case the patient belongs and whether to refer or not.*" (Family physician_Dr Z). It is therefore not possible for them to deal with each problem at the same level as the specialist. As one family physician said: *"(for eye problems), it is a bit difficult as all we do is look at the patient. We don't really have the equipment and specialty to examine the patient.*" (Family physician_Dr O). Furthermore, the work conditions in the community clinics also create problems in achieving the competencies expected by the specialists. For example, a family physician faces significant time pressure in examining each patient for multiple problems (about 15 minutes per patient consultation). This limits the amount of time to apply the guidelines that each specialty may have. Community clinics also have a high turnover of physicians, as junior family physicians are often rotated in and out of these clinics as part of the Ministry of Health's training policies. As such, there will always be inexperienced and less trained family physicians involved with the referrals.

Thus from a PT perspective, this COC challenge represented a form of learning tension due to the conflict between the family physician's generalist knowledge and competencies and the need for the family physician to acquire some level of specialist knowledge and competencies. While learning tension in organizational studies focuses on the new vs. past knowledge, the context in our case study is triggered by the plurality of knowledge and competencies found in the two types of clinics – community vs. specialist clinics. As Lim et al.'s (2015) study suggests, different healthcare workers involved in patient care transitions have different bases of knowledge as well as varying levels of knowledge. This influences how information should be transferred, which in turn can affect patient care outcomes. In this case, an effective patient referral process with strong management continuity requires both the specialist and primary care physician to align their assessments with regard to a patient's referral needs. Although the integrated EMR system's impact on information continuity enabled the specialists to have a better sense of why the patient was referred and raised their awareness of other pertinent patient issues, this only helped improve the specialists' ability to advise the referred patients. It did not change the number of inappropriate referrals since the differences and gap in knowledge and competencies were never addressed.

## Discussion

Our study aims to understand why effective COC continues to be challenging even when supported by an integrated EMR system. Our findings from the in-depth case study reveal that achieving COC is a complex endeavour. As per existing research, we show how the integrated EMR had positive impacts on informational and management continuity for specialist referrals as shown in both the physicians' and the administrative team's work. The integrated EMR enabled referrals and patient information to be transferred with ease and that improved informational continuity for both the physicians and administrative staff. At the same time, improvement in management continuity was achieved and enabled by the new integrated EMR system's HIT functionalities (e.g., the referral workqueue and memo function) and process changes (e.g., the hospital's new referral process to community clinics). However, our findings also show several important COC challenges (such as the high number of referrals not able to get timely appointments, or continued occurrence of inappropriate referrals) persisted despite the effective use of the

integrated EMR system. Using the Paradox Theory perspective to analyze these COC challenges, we uncover the opposing demands in the specialist referral context that underlie these persistent challenges, which undermined the positive impacts of the integrated EMR system.

While the literature has suggested that there are various contextual challenges that may impede COC, they have not provided a systematic approach to understand how and why these challenges undermine an integrated HIT's positive effect on COC (Lim et al. 2015; Mehrotra et al. 2011; Rudkjobing et al. 2012). Our study draws on PT to help us conceptualize these challenges, as the PT perspective provides a comprehensive way to understand what type of paradoxical tensions exist within the healthcare system, why they arise, and how they impact COC. Our analysis of the case study reveals two paradoxical tensions that were salient in this specialist referral context at an inter-organizational level – performing tension and learning tension – and we consider a) the triggers (why) for these tensions, b) how these tensions interfered with the HIT's impact on COC, and c) types of actions that could be considered to mitigate these tensions so as to improve COC.

## *Persistent COC Challenges and Paradoxical Tensions*

By drawing on PT to analyse the complex relationship between HIT implementation and COC, we were sensitized to how different aspects of the specialist referral context may directly or indirectly contribute to opposing demands that lead to paradoxical tensions, which then limit the HIT's positive impacts on COC. In our case study, we found two sets of opposing demands that contributed to continued COC challenges and we matched these two sets of opposing demands to two types of paradoxical tensions: performing and learning tensions. We discuss below how these tensions interfered with the COC and the cause or trigger for these tensions.

In the case of performing tension, we note that while community clinics and specialist clinics all belong to the same organizational cluster, I physicians and clinics are motivated by different goals. Although the family physicians and specialists are focused on providing good patient care, their focus and approach are not similar – where the family physician aims to manage their patient's choice and the specialist clinics aim to manage the availability and access for patients who require specialist care. Even though the EMR system improved the informational and management continuity in the administrative processes for the administrative staff so that they could handle more cases, these improved continuities did not resolve the issue of having sufficient appointments for urgent referrals due to the high demand for specialist care. In this way, performing tension interfered with the overall management continuity in spite of the EMR system improvements within the administrative processes.

From PT perspective, we noted why the performing tension and its underlying opposing demands arose in this context and why it was ironically exacerbated by the integrated EMR system. Specifically, we noted that the performing tension was triggered by **scarcity** caused by existing institutional policies and practices in the healthcare system. In the case study context, the scarcity of specialist appointments in hospitals arise partly due to Singapore's Ministry of Health specialist care subsidy policy that subsidises all specialist care if the patient is referred by community clinics. At the same time, the supply of specialists in Singapore is constrained by the limited pool of trained physicians and the time required to train specialists. This situation resonates with other studies that have pointed to the role of institutional factors (e.g., insurance payment policies) in impacting COC and specialist referrals (Mehrotra et al. 2011; Rudkjobing et al. 2012; Straus et al. 2011). While those studies discuss how institutional factors directly affect the use of integrated HIT to reduce unnecessary referrals (i.e., they do not reimburse specialists that screen potential referrals), our PT analysis reveals that institutional factors may also have an indirect influence on HIT's impact on COC – in that they create the conditions that trigger performing paradoxical tensions.

In the case of learning tension, even though the HIT improved informational continuity for the family physicians and specialists so that they can have better patient information and clearer referral notes, the issue of inappropriate referrals persisted since family physicians' and specialists' knowledge domains are different and yet the family physician needs to acquire some level of specialist knowledge and competencies to align their assessment of referrals. Hence, even though the integrated HIT improved informational continuity, the learning tension meant that there are challenges to the creation of common protocols, guidelines, and sharing of management plans as envisioned by Pinsonneault et al.'s (2017) study. Without

these common protocols and shared plans, HIT's first order impact on informational continuity would not bring about the second order effect on relational and management continuity as theorized in Pinsonneault et al.'s (2017) study.

Related to the learning paradoxical tension in our context is the issue or trigger of **plurality** arising from the close collaborative relationship between family physicians and specialists – a fundamental result of referral work. In our findings, plurality triggers the learning tension that manifests in the disagreement over reasons for referrals (the specialists' view that a family physician's referral is inappropriate) (Forrest 2009; Lee et al. 1983). While in most cases the referring family physicians would defer to the specialists, Lim et al. (2015) found that clinicians from different professional fields may continue to ignore differences in knowledge and focus on their own knowledge domains and specialties when dealing with patient care transitions. For example, the family physicians in our study argued that their focus is on the whole-person and they often have to treat multiple chronic conditions, which may influence their assessment despite having access to the specialists' referral guidelines. These differences in professional opinions are exacerbated by different (and in some cases, conflicting) knowledge elicited from the patient at different points of time and under different working conditions, as well as the limited or lack of specialist-family physician interactions.

Put together, our PT perspective and analysis provides a more complex and nuanced understanding of EMR-enabled COC and in particular, how the three types of continuity can be improved in the specialist referral context. While IS research has shown how integrated HIT could enable COC across different healthcare organizations and physicians (Pinsonneault et al. 2017), our study clearly shows how and why that may not be fully realized or may even be aggravated by salient paradoxical tensions and their associated triggers. As such, we believe that future research should adopt the PT perspective to help researchers focus on deep-seated, latent or salient tensions that tend to get overlooked in the usually effort-intensive HIT implementation projects. By paying attention to these tensions, researchers can carefully trace and uncover important institutional, organizational, and work factors that may be related to these tensions. HIT implementation projects targeted at COC could then take these factors into account as part of their ongoing improvement plans.

### *Adopting a Both-And Approach to Address Paradoxical Tensions*

Our study shows how PT can be applied as a generative theoretical framework for thinking about challenges that arise from HIT implementation projects beyond those of user issues and information and process designs (Chiasson and Davidson 2005). More importantly, we could continue to draw on the framework of paradoxical tensions as derived from PT and relevant associated literature to develop an approach to mitigate or resolve paradoxical tensions that are both HIT and non-HIT related (Hargrave and Van de Ven 2017; Jarzabkowski et al. 2013; Smith and Lewis 2011).

Although it is beyond the scope of our current case study data, PT informs us that an appropriate way to manage the performing or learning tensions after the EMR implementation is to address the two ends of the paradox (both-and approach) while other responses that only address one of end of the paradox may exacerbate it (either-or approach) (Jarzabkowski et al. 2013; Smith and Lewis 2011). For example, in the case of performing tensions, a both-and approach may involve alleviating the pressures at both the community clinic and the specialist clinics. This may include changing existing subsidy policies so that there is no longer a blanket subsidy for all specialist referrals from community clinics. Furthermore, the specialist clinic's capacity could be increased by creating new roles e.g., specialist nurses can take over some of the specialists' work (an example is the hospital's rapid access cardiology clinic being managed by specialist nurses) (Pottle 2005). Similarly for learning tensions, one set of both-and responses could be to have the family physicians and specialists jointly develop specialist referral guidelines that are adapted to family physicians' work conditions. This type of continuous training and development sessions would increase interactions between family physicians and specialists and may help build shared understanding between different physicians (Lim et al. 2015; Mehrotra et al. 2011). Another approach could be to embed these jointly-developed referral guidelines within the EMR system as a clinical decision support for family physicians when ordering a referral. This can act as a reminder or guide for those who are new to the community clinics.

In this way, PT acts as a generative framework that not only helps us identify the paradoxical tensions and the underlying opposing demands within a referral context, but also provides ways to develop responses that attempt to address these tensions. Practically, adopting the PT perspective may enable healthcare management to think holistically about direct and indirect factors that surround the focal healthcare processes they are changing. As observed in our findings, these factors (such as institutional policies and capacity constraints) need to evolve in parallel with HIT implementation. These management responses would complement the HIT and associated process changes to mitigate COC challenges that have their roots in performing, learning, belonging, and organizing tensions. Yet, research also shows that these responses need to be carefully implemented because paradoxical tensions can often recur as they are often linked to deep-seated issues (Smith and Lewis 2011). For example, some family physicians may choose to override the referral guidelines within the EMR system due to their own professional judgement, which undermines the effectiveness of this response to mitigate learning tensions.

### *Limitations and Future Research*

Being an in-depth case study research, the main limitation is the extent to which our findings are generalizable beyond our case. For example, in our case study, all the community clinics and specialist clinics belong to the same hospital cluster. As such, we did not observe any belonging tension that may be salient in other implementations – e.g., integrated HIT for private family practices with a government hospital. Likewise, we did not observe organizing tensions since all the medical domain and hospital systems in Singapore's public health system tend to be highly institutionalized and regulated and as such, the processes and policies across the clinics we studied did not vary as much. Future research could consider whether such tensions – belonging and organizing tensions – are salient in other countries' hospital systems involving different organizations and institutional policies. Furthermore, the use of the integrated EMR system is mandatory and the implementation process was uneventful. This may not be the case for other HIT implementations – where its use may be elective-based or if the HIT project was not as successful. As such, future research could help enrich our understanding of what paradoxical tensions are salient and how their influence on HIT's impact on COC is similar or different from our findings under such conditions. In sum, while much of our insights may be due to specific factors of our case study organization, we have attempted to draw out various theoretical insights that are based on PT which are applicable in other contexts (Lee and Baskerville 2003). We believe those theoretical insights are robust and provide an important foundation to build and extend on for other HIT and COC-focused studies. In this way, we hope that it assists in the global effort to improve COC for all.

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# APPENDIX

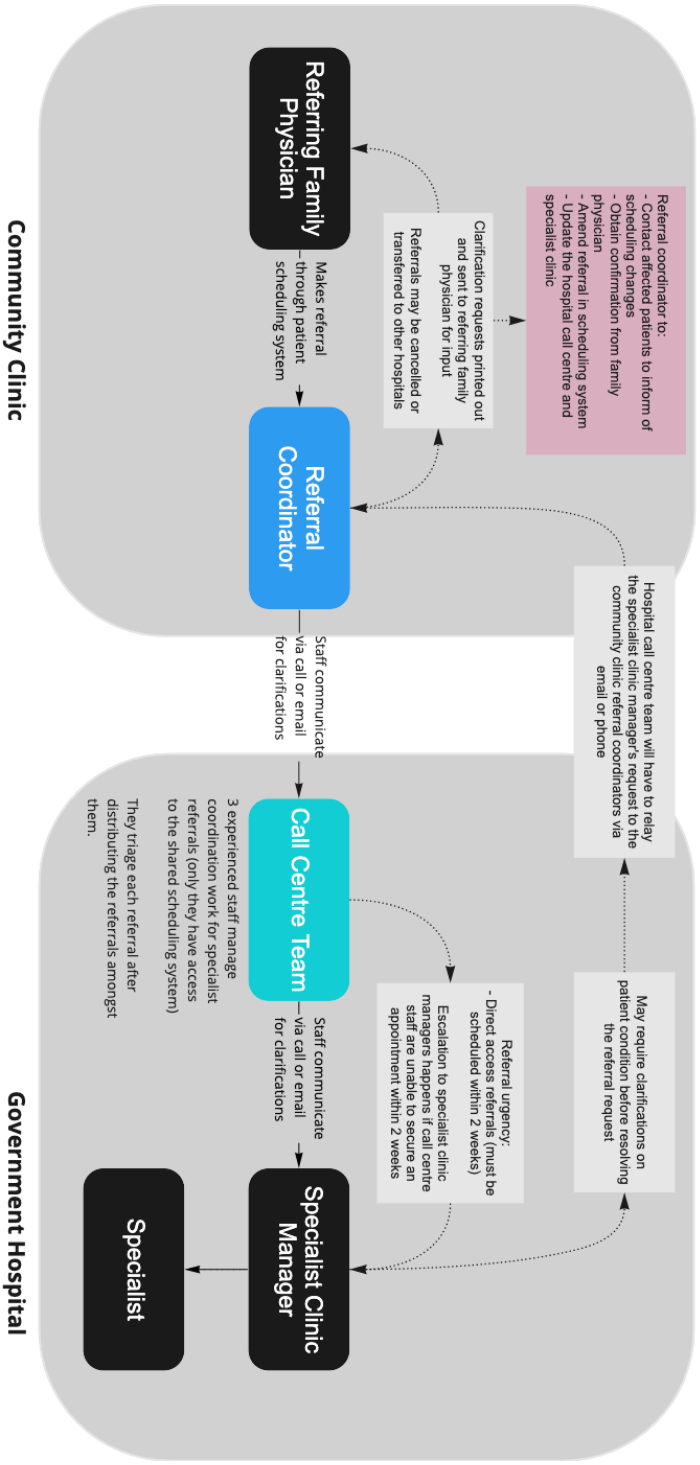


**Figure 1. Referral Clarifications Between Community Clinics and Specialist Clinics (Direct Access Cases)**