Why Do Acquisitions Negatively Affect Patient Outcomes at Target Hospitals: Quiet Life Hypothesis or Disruptions Caused by Acquisition Integrations?

Huseyin Tanriverdi
University of Texas at Austin
huseyin.tanriverdi@mccombs.utexas.edu

Xiaoxuan Yang
University of Texas at Austin
stephenyang@utexas.edu

Yilin Wen
University of Texas at Austin
paulywen@utexas.edu

Abstract

Care quality declines at target hospitals following mergers and acquisitions (M&A) by multihospital health systems (MHSs). The declines have been attributed to the M&A's consolidation and competitive intensity reduction effects. Insulated from competition, managers may choose to enjoy the "quiet life" instead of taking on difficult tasks to improve care quality. In addition to subjecting this hypothesis to empirical scrutiny, we propose and test a disruption hypothesis: IT M&A integrations and medical service integrations between an MHS and a target could cause disruptions to the target's care processes and reduce the quality of patient outcomes. We find support for both hypotheses in a sample of 629 M&A transactions conducted by 179 unique MHSs and 579 unique target hospitals in the U.S. hospital industry during 2009-2017. Reduced competitive intensity increases mortality rates. IT M&A integrations increase readmission and mortality rates whereas service integrations increase only readmission rates in target hospitals.

Keywords: Hospital, merger, IT M&A integration, service M&A integration, patient care outcome quality

1. Introduction

The surge in mergers and acquisitions (M&A) in the U.S. hospital industry since 2009 has led to consolidation, concentration, and reduced competitive intensity in patient markets. It also led to the emergence of the multihospital system (MHS), an umbrella organization that owns two or more hospitals (Cuellar and Gertler 2005). MHSs now control 67% of U.S. hospitals and 76% of hospital beds (AHA 2023). Researchers and practitioners seek to understand whether and how MHSs add value to financial performance and care quality at target hospitals. The "market for corporate control" hypothesis expects inefficiently managed hospitals to become acquisition targets and achieve performance improvements under the parenthood of a more efficiently managed hospital system (Manne 1965). However, empirical studies failed to find evidence of such improvements in care quality. A recent study found that patient outcomes such as readmission rates and mortality rates did not improve, and patient experience metrics became worse in target hospitals following acquisitions by MHSs (Beaulieu et al. 2020). Health economists explain such disappointing results by arguing that M&A transactions lead to consolidation, increase concentration rates, and reduce the intensity of competition in patient markets. The "quiet life" hypothesis explains further why the reduced competitive intensity leads to declines in service quality. In competitive patient markets, hospital managers have incentives to give their best effort for quality improvements. When M&A increases concentration and insulates hospitals from competition, managers may choose to enjoy the "quiet life" instead of making hard decisions or taking on difficult tasks to improve the quality of patient care (Ikeda et al. 2018).

In the broader M&A literature, the disruption hypothesis is an alternative explanation for the target's declining service quality following an acquisition. Namely, in the process of integrating business processes and IT systems of targets with their own, acquirers cause disruptions to targets' business processes, which reduce targets' service quality. To date, empirical M&A studies have not tested these hypotheses. We do not know whether the quiet life hypothesis or the disruption hypothesis, or both, would account for the service quality declines in targets. We address this gap. We control for concentration rate and competitive intensity in patient markets to account for the quiet life explanation. We also study how IT M&A integrations and medical service integrations between MHSs and targets affect the quality of patient outcomes at target hospitals to account for the disruption hypothesis. We find support for both hypotheses in a sample of 629 M&A transactions conducted by 179 unique MHSs and 579 unique target hospitals in the U.S. hospital industry during 2009-2017. Competitive intensity reduces mortality rates, but when M&A reduces competitive

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intensity, mortality rates increase. IT M&A integrations increase readmission and mortality rates whereas medical service integrations increase only readmission rates in target hospitals.

2. Theoretical Background

The empirical results on M&A's effects on patient outcomes are mixed. One study tracked patients of a target before and after acquisition by an MHS and found that the full clinical and operational integration of the target with the MHS reduced mortality rates at the target (Wang et al. 2022). Another study, which examined service integration and consolidations in one merger, warned that the consolidation of inpatient services could greatly increase the risk of an untoward event. Specifically, the study argued that the provision of inpatient services in a new physical environment, difficulty in orientating caregivers to new equipment, and the transfer of large numbers of acutely ill patients could elevate risks to patient safety (Gering et al. 2005). A third study found that acquirers eliminated or reduced some services of rural hospitals after gaining control and called for research on the effects of reduced service lines on patient outcomes (Jiang et al. 2021). Others found that there have been disappointing declines in patient outcome quality following acquisitions of targets by MHSs (Beaulieu et al. 2020; Hayford 2012; Ho and Hamilton 2000). Health economists and strategists attributed the lack of care quality improvements or negative patient health outcomes of M&A to the consolidation and competition-reduction effects of M&A and the lack of clinical and operational integrations of targets with MHSs (Cuellar and Gertler 2005; Eickholt 2020).

The "quiet life hypothesis" offers one explanation for declining patient outcome quality at targets. When M&A activity increases the concentration rate in the target's patient market, the target gains more market power and faces less competitive pressure. Being insulated from the disciplinary effects of competition, targets' managers become less ambitious; reluctant to undertake cognitively difficult activities; underinvest; and avoid risky and complex investments that would require managerial time and effort. Put differently, targets' managers prefer to live a "quiet life" when they do not face competitive pressures (Ikeda et al. 2018). Patient outcome quality can suffer at the target as managers refrain from investing the time and effort required to maintain and improve the quality of care.

The "disruption hypothesis" offers a competing explanation for the declining quality of care services and patient outcomes at targets. MHSs often justify M&A deals with the potential to create cross-hospital synergies with targets (Tanriverdi and Du 2011). M&A integrations between MHS and the target are critical success factors for realizing the synergies that motivate the M&A deals (Tanriverdi and Uysal 2011). However, M&A integrations are difficult to do, and they could cause disruptions to the care delivery processes of the target and reduce the quality of patient outcomes. We refer to this phenomenon as the disruption hypothesis.

IT integrations and patient outcomes. Generally, IS studies focusing on health IT adoption and integration during regular operations find that health IT integration could address problems of fragmented care delivery within MHS and improve the quality of care (Pinsonneault et al. 2017). However, how IT M&A integrations between acquirers and targets affect the quality of care is not yet well understood. Only a handful of studies focused on IT M&A integrations in the context of hospital M&As (Du 2015; Ovretveit et al. 2007; Steininger et al. 2016; Vieru and Trudel 2013; Wijnhoven et al. 2006). They focused primarily on the financial performance implications of IT M&A integrations (Du 2015; Tanriverdi and Du 2011). There has been a shortage of studies that focus on the link between IT M&A integration and patient outcome quality. Some case studies suggest that IT M&A integration may have a positive effect on patient outcomes (Ovretveit et al. 2007; Vieru and Trudel 2013). However, IT M&A integration is challenging to do. An acquirer may have to incur significant IT CapEx to modernize outdated or inadequate IT systems of a target (Tanriverdi and Du 2011). Dissimilar IT systems between acquirer and target could create barriers to IT M&A integrations. IT M&A integration also entails major change management processes fraught with implementation risks. They can prove disruptive to targets (Tanriverdi and Uysal 2015) and lead to adverse effects on care delivery processes and patient outcomes (Wang et al. 2022).

Medical service integrations and patient outcomes. Patient outcome quality at targets could also be affected by the extent to which MHS integrates medical services of targets. An MHS can have motivations to integrate medical services of a target with those of other hospitals and care facilities within the MHS to achieve economies of scale, reduce costs of care, create an integrated patient referral chain among member hospitals, coordinate patient care, and improve quality of care (Cuellar and Gertler 2005). However, such vertical integration initiatives within MHSs have had mixed effects on patient outcomes (Dranove and Shanley 1995; Freeman et al. 2021; Kristensen et al. 2010; Menke 1997). Some studies found that vertical integration within MHS led to positive patient-centered outcomes (Machta et al. 2019). Some studies found that vertical integration of acquired clinics improved some quality measures but worsened other measures of quality (Machta et al. 2019). Others found that vertical integration had limited effects on a small subset of quality measures while concentration rate was strongly associated with reduced quality (Short and Ho 2020). In the context of M&A integrations, we expect medical service integrations to cause disruptions to care delivery processes at target, and negatively affect patient outcome quality.

3. Methods

Our sampling frame is all hospital acquisitions of all MHSs in the U.S. hospital industry during 2009-2017. Appendix Table 1 presents the data sources used to construct the sample and measure the study variables.

Matching, comparing, and cross-validating hospital M&A transactions in the two M&A data sources (HIMSS and Levin Associates) yielded an initial sample of 629 M&A transactions conducted by 179 unique MHSs and 579 unique target hospitals in the U.S. hospital industry during 2009-2017. We focused on first-time acquisitions of targets by dropping 50 targets which went through multiple M&A transactions to change ownership multiple times. This step reduced the sample size to 579 M&A transactions by 173 unique MHSs and 579 unique targets. Further, as elaborated below, to apply the difference-in-differences (DID) framework, we focused on transactions consummated from 2011 through 2016 so that we could observe and test the parallel trends in performance outcomes of targets for at least two years before the transactions, and we can also analyze target's performance at least one year after the transaction year. The final sample retained for data analyses included 487 M&A transactions by 139 unique MHSs and 487 unique target hospitals during 2009-2017.

HIMSS database provided data on IT applications and organizational characteristics of hospitals (i.e., organizational type, IT application status, application vendors, hospital specialty, etc.). The Provider of Services (POS) files from the Centers for Medicare & Medicaid Services (CMS) provided data on hospital medical services. POS files track medical services provided by each hospital and whether a specific service is insourced or outsourced. Data on patient outcomes of hospitals were obtained from the Hospital Quality Initiative Public Reporting - Hospital Care Compare and Provider Data Catalog. Lastly, the financial outcomes data was obtained from the Healthcare Cost Report Information System (HCRIS) Database.

3.1. Dependent Variables

Following Beaulieu et al. (2020), we obtained four measures of patient outcome quality using publicly available data from Medicare Hospital Compare. These measures included: (1) a composite of patient experience measures (PX), (2) a composite of clinical process quality measures (CP), (3) all-cause readmission rates after discharge (RR), and (4) all-cause mortality rates (MR). The six patient experience items from the Hospital Consumer Assessment of Healthcare Providers and Systems survey had a Cronbach's alpha of 0.91, indicating sufficient reliability. The process measures included eight items related to cardiac, pneumonia, and perioperative care. Cronbach's alpha was 0.75, indicating sufficient reliability. We calculated a composite score for the patient experience measures and the clinical process measures as the average of z-scores for each component measure with non-missing data. All-cause readmission rates and all-cause mortality were estimated as weighted sums based on heart attack, heart failure, and pneumonia.

3.2. Independent Variables

IT similarity. We measured patient IT integration between acquirer and target by tracking similarities in their patient IT application portfolios before, during, and after the M&A year. We computed the patient IT similarity of MHS and target at three different geographic markets: CBSA, State, and National. MHSs are likely to integrate a target with their nearest member hospitals. If MHS had member hospitals within the same CBSA as the target, the CBSA-level IT similarity measure captured the IT integration within the CBSA. If MHS did not have member hospitals in the same CBSA as the target, but if it had member hospitals in the same state, state-level IT similarity measure captured IT integration at the state level. If an MHS had no member hospitals in the same CBSA or state as the target, the national-level IT similarity measure captured the IT integration of the target with the MHS's member hospitals in other states.

We computed the patient IT similarity between acquirer and target by comparing the respective patient IT application portfolios of the target and MHS member hospitals in each year within the three levels identified in the previous step. We used the HIMSS "HAEntity Application" table to identify patient IT application portfolios. In the HIMSS database, we identified about 64 patient IT applications (e.g., EHR, PACS, CPOE, etc.). We retained all patient IT Applications that were "live and operational" in a given year. Within each category, we compared the patient IT applications of both the acquirer and the target to determine if both entities had the application and whether the application came from the same vendor. We assigned [0] to the similarity score of a patient IT application if one entity had the application, but the other did not; [1] if both had the IT application, but from different vendors; and [2] if both had the IT application from the same vendor. After doing this classification for all (n) IT applications in a category, we added up the similarity scores and divided the sum by 2n (maximum possible similarity) to obtain the patient IT similarity within that IT application category in a given year. We computed the Patient IT Similarity Scores at CBSA (PtITSim_CBSA), state (PtITSim_State), and National (PtITSim_National) levels.

Service similarity. We processed the POS files to identify that there were 73 common medical service categories in the hospital industry during 2009-2017. To match the services data from the POS files to entities involved in the transactions, we used the "provider number" from the POS files and the "Medicare number" from the HIMSS files. Then, we followed a process similar to the computation of patient IT similarity measures to compute service similarity between acquirer and target at CBSA, State, and National levels. We set the service similarity within a given category to [0] if one entity offered the service, but the other did not; to [1] if both entities offered the services but selected a different governance mode for it (one entity insourced it, the other one outsourced the service); and to [2] if both entities offered the service using the same governance mode. We then calculated the service similarity score within the level identified (SerSim_CBSA, SerSim_State, or SerSim_National) by summing up the similarity scores of all (m) service categories and dividing the sum by 2m (maximum possible similarity). We applied these computations to all M&A transactions in each year of the study timeframe.

3.3. Control Variables

We included controls to account for characteristics of acquiring MHS and target hospitals. To account for MHS characteristics, we controlled for an MHS's scope of medical services (MHS_ScpSer) by dividing the number of unique medical services offered by all member hospitals of an MHS in a given year by the number of unique services offered in the hospital industry in that year. We also controlled for an MHS's digitalization level (MHS_DigiLvl) by dividing the number of unique IT applications across all member hospitals of the MHS in a given year by the number of unique IT applications in the hospital industry in that year. Likewise, we controlled for the scope of medical services (Tgt_ScpSer) and the digitalization level (Tgt_DigiLvl) of the targets. To account for patient mix, we controlled for the ratio of Medicare-certified beds in the target (MedicareBeds(%)) by dividing the number of Medicare-certified beds by the total number of beds in the target hospital in that year. Lastly, we controlled for the cost-to-charge ratio (CCR) of the target by dividing "total costs" by "total charges (revenues)" using data from the Healthcare Cost Report Information System (HCRIS) database. To account for competitive intensity in the patient market of targets, we controlled for the number of MHSs in the same CBSA as the target (CompetitiveIntensity). We also controlled for the market's concentration rate by calculating the Herfindahl-Hirschman Index (Concentration) for each hospital's CBSA market. Appendix Table 2 provides the descriptive statistics and correlations of the study variables.

3.4. Endogeneity and Identification Strategy

This study aims to identify the causal impact of IT integration and service integration on patient outcome quality. However, a simple correlation may be troubled by serious endogeneity issues and therefore cannot give a reliable causal explanation. Examples of such endogeneity problems include reverse causality (e.g., hospitals looking to improve patient outcome quality may do more IT or service integration) and omitted variable bias (e.g., unobserved factors such as management model and market environment may affect IT and service integration and patient outcome quality).

Based on the quasi-experimental variation generated by the staggered rollout of M&A transactions we use a DID approach to obtain estimates that can be more credibly interpreted as causal. We compare the before-after differences in patient outcomes between target hospitals after M&A integration and target hospitals before M&A integration between the two periods.

3.5. Model Specification

We estimate the following two-way fixed effects (TWFE) model to examine the effect of different levels of IT integration on patient outcome quality.

$$Q_{it} = \alpha_0 + \alpha_1 Trans_{it} + \alpha_2 ITSim_{it} + \alpha_3 SerSim_{it} + \beta ITSim_{it} \times Trans_{it} + \theta X_{it} + \delta_i + \lambda_t + \varepsilon_{it}, \quad (1)$$

where Q_{it} indicates one of the four quality of care measures of the acquired hospital i in year t; $Trans_{it}$ is a dummy variable for whether the hospital was acquired or not, which equals 1 for acquired hospitals in acquisition year t and thereafter, and 0 otherwise; X_{it} is a series of time-varying control variables; δ_i and λ_t are hospital and year fixed effects, respectively; ε_{it} is the error term. The $ITSim_{it}$ and $SerSim_{it}$ terms are a vector of IT similarity and service similarity at the CBSA, state, and national levels, respectively. The coefficient β is the quantity of interest indicating the average treatment effect on the treated (ATT) of IT integration on quality of care.

Further, to study the impact of different levels of service integration on outcome quality, we estimate the following modification of model (1). In this specification, we control for the interaction term between service similarity and transactions. We do not include the interaction term of IT similarity with transactions due to multicollinearity considerations.

$$Q_{it} = \alpha_0 + \alpha_1 Trans_{it} + \alpha_2 ITSim_{it} + \alpha_3 SerSim_{it} + \gamma SerSim_{it} \times Trans_{it} + \theta X_{it} + \delta_i + \lambda_t + \varepsilon_{it}, \quad (2)$$

where the coefficient of interest γ identifies the ATT of service integration on outcome quality.

To test for parallel trends and investigate the dynamic effects of IT and service integration, we also estimate event study versions of model (1) and model (2), including indicators for distance to/from the introduction of M&A and using -1 period (1 year before the transaction) as the reference group.

4. Results

Table 1 presents the results of the main effects of IT similarity and service similarity as well as their interactions with M&A transactions.

Columns (1) - (4) include the main effects of M&A transactions, IT similarity, service similarity, and the control variables. The main effect of IT similarity at the state level significantly reduces the consistency of clinical processes and significantly increases readmission rates. Service similarity at the CBSA and state levels significantly reduces readmission rates. Service similarity at the national level significantly reduces the consistency of clinical processes.

Test of the disruption hypothesis. Columns (5) - (8) add the interactions of IT similarity measures with M&A transactions to test if IT M&A integrations cause disruptions to target and negatively affect patient outcomes. The results on the interaction terms indicate that, following M&A transactions, both CBSA and state-level IT similarity significantly increase readmission rates and mortality rates. These results provide support for the disruption hypothesis. Increased IT similarity due to IT M&A integration between acquirer and target proves disruptive to the target and negatively affects some patient outcomes.

Columns (9)-(12) add the interactions of service similarity measures with M&A transactions to test how service M&A integrations affect patient outcomes. In these models, we had to remove the interaction terms of IT similarity and M&A transaction to avoid potential multicollinearity problems, as there were high correlations between IT similarity and service similarity measures. The results indicate that, following M&A transactions, similarities of services at CBSA, state and national levels all significantly increase readmission rates. These results also indicate that service integrations between acquirer and target following M&A transactions prove disruptive to the target and reduce some measures of patient outcome quality. Thus, they also support the disruption hypothesis.

Test of the quiet life hypothesis. We test the quiet life hypothesis by examining results on the control for competitive intensity in the target's patient market. Appendix Table 3 reports the results on the control variables. Higher levels of competitive intensity significantly decrease mortality rates. These results suggest that, as M&A lowers competitive intensity, it would also reduce the consistency of clinical processes and increase mortality rates. Thus, the results support the quiet life hypothesis.

In Appendix Figure 1, we present the dynamic effects of the IT and M&A interaction terms that had significant effects on patient outcomes in Table 1. Each panel validates the parallel trend assumption. Over the long term, Figure 1A shows that CBSA-level IT M&A integration significantly increases the target's readmission rates even in the sixth year after transactions. Figure 1B shows that CBSA-level IT M&A integration also significantly increases the target's mortality rates, which do not begin to decline until the third year post-transaction. Figure 1C shows that state-level IT M&A integration on average increases readmission rates after the transaction. Although this increase does not appear to be significant in Figure 1C, it was marginally significant in the regression results of Table 1. Thus, the state-level IT M&A integration does not seem to increase the target's readmission rates as significantly as CBSA-level IT M&A integrations presented in Figure 1A. Figure 1D shows that the significant increase in mortality rates caused by state-level IT M&A integration does not begin to decline until the fifth year after the transaction.

Appendix Figure 2 presents the dynamic effects of the service and M&A interaction terms that had significant effects on patient outcomes in Table 1. We did not find any discernible pre-existing trends. Furthermore, in the long run, Figure 2A shows that service M&A integration at the CBSA level significantly increases readmission rates even in the sixth year after M&A. Figure 2B shows that state-level service M&A integration leads to significantly higher readmission rates, which do not begin to decline until the third year after the transaction. Figure 2C shows that the significant increase in readmission rates due to national-level service M&A integration can be observed up to the fifth year post-transaction.

5. Discussion and Conclusions

The findings add to the existing body of knowledge on M&A's effects on quality of care. By finding support for both the quiet life and the disruption hypotheses, the study uncovers the two mechanisms that are simultaneously at work in reducing patient outcome quality at target hospitals following acquisitions by MHSs.

Table 1: Effects of M&A, IT integration and service integration on quality of care

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	PX	CP	RR	MR	PX	CP	RR	MR	PX	CP	RR	MR
Transaction	0.069	0.023	-0.131	-0.062	0.134	-0.042	-0.541**	-0.304	0.232*	0.027	-0.844**	0.017
	(0.048)	(0.046)	(0.101)	(0.105)	(0.086)	(0.097)	(0.231)	(0.186)	(0.130)	(0.112)	(0.396)	(0.217)
PtITSim_CBSA	-0.045	-0.132	-0.073	-0.381	0.087	-0.236	-0.839	-0.851**	-0.031	-0.139	-0.135	-0.391
	(0.113)	(0.144)	(0.402)	(0.233)	(0.197)	(0.255)	(0.533)	(0.386)	(0.117)	(0.148)	(0.392)	(0.243)
PtITSim_State	-0.154	-0.350***	0.920***	-0.076	0.034	-0.467**	0.199	-0.640	-0.112	-0.348**	0.776**	-0.050
	(0.130)	(0.132)	(0.318)	(0.375)	(0.178)	(0.206)	(0.577)	(0.623)	(0.125)	(0.138)	(0.334)	(0.386)
PtITSim_National	-0.163	0.030	0.590	-0.557	-0.060	-0.042	0.261	-0.843	-0.164	0.015	0.629	-0.625
	(0.216)	(0.125)	(0.745)	(0.727)	(0.227)	(0.157)	(0.807)	(0.717)	(0.198)	(0.131)	(0.681)	(0.720)
SerSim_CBSA	0.397	-0.194	-1.250*	-0.063	0.445	-0.219	-1.564**	-0.247	0.699***	-0.213	-2.657**	-0.022
	(0.303)	(0.256)	(0.648)	(0.699)	(0.292)	(0.237)	(0.683)	(0.725)	(0.267)	(0.336)	(1.074)	(0.864)
SerSim_State	0.337	0.058	-1.897***	-0.415	0.384*	0.021	-2.118***	-0.564	0.665***	0.067	-3.191***	-0.200
	(0.252)	(0.300)	(0.620)	(0.574)	(0.223)	(0.289)	(0.549)	(0.548)	(0.251)	(0.337)	(0.879)	(0.710)
Sersim_National	0.370	-0.413***	-1.104	0.251	0.358	-0.404**	-1.605*	0.119	0.654*	-0.384	-2.392*	0.509
	(0.337)	(0.155)	(0.997)	(0.881)	(0.304)	(0.173)	(0.939)	(0.909)	(0.369)	(0.268)	(1.346)	(0.975)
PtITSim_CBSA × Transaction					-0.141	0.132	0.889**	0.525*				
					(0.146)	(0.177)	(0.364)	(0.312)				
PtITSim_State × Transaction					-0.227	0.183	0.845*	0.670*				
					(0.163)	(0.168)	(0.483)	(0.395)				
PtITSim_National × Transaction					-0.008	0.027	1.172	0.381				
					(0.237)	(0.133)	(0.711)	(0.572)				
SerSim_CBSA × Transaction									-0.347	0.024	1.635**	-0.038
									(0.268)	(0.209)	(0.798)	(0.402)
SerSim_State × Transaction									-0.417	-0.024	1.621**	-0.290
									(0.264)	(0.220)	(0.768)	(0.359)
Sersim_National × Transaction									-0.333	-0.059	1.517*	-0.319
									(0.378)	(0.203)	(0.808)	(0.629)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-square	0.785	0.752	0.773	0.682	0.785	0.752	0.774	0.683	0.785	0.751	0.773	0.682
Observations	1870	1005	1848	1850	1870	1005	1848	1850	1870	1005	1848	1850

Notes: Standard errors clustered at both MHS and State levels and presented in parentheses; p-values: *p<0.10, **p<0.05, ***p<0.01.

Contributions to research. The prevailing explanation in health economics and strategy literature for the declines in patient outcomes following M&A was the competition-reduction effects of M&A (Beaulieu et al. 2020), also known as the "quiet life hypothesis." While the validity of this hypothesis is widely assumed, the hypothesis has rarely been subjected to empirical tests. We make a contribution by conducting a large sample test of this hypothesis and finding support for it. In addition, we propose and validate an additional explanatory mechanism, namely the disruptive effects of IT M&A integrations and service M&A integrations on patient outcomes. The study alerts researchers that M&A negatively affects patient outcomes at targets due to both the quiet life preferences of managers and the disruptive effects of M&A integrations.

The prevailing assumption in the IS literature is that adopting health IT and integrating health IT systems in an MHS would have positive outcomes. While IS research studied financial performance outcomes of hospital M&A, it has rarely studied the effects of IT M&A integrations on patient outcomes. Our study addressed these gaps. The findings on the main effects of IT integration support the prevailing assumption of the IS field that IT integration has positive effects on patient outcomes. However, we also uncover that IT M&A integrations negatively affect patient outcomes. This is a new insight. Likewise, the study uncovers that while service integration is good for patient outcomes, service M&A integrations prove disruptive to care delivery and reduce the quality of patient outcomes. These findings alert IS researchers to revise their assumptions about the effects of IT and service integrations on the quality of care. During M&A transactions, these integrations prove disruptive and reduce the quality of care. These discoveries call for further research. M&A integrations in business and IT are critical success factors for realizing the goals and the deal economics that motivate M&A deals. We need to understand why IT M&A integrations and service M&A integrations disrupt care processes and how acquirers could govern these M&A integrations to prevent their negative effects on patient outcome quality.

Implications for practice. A key implication of the findings for hospital industry executives is to be aware that patient lives might be at stake when they do IT M&A integrations and service M&A integrations. Due to the cost reduction pressures they face from the government, insurance firms, employers, and other payors, executives might be tempted to aggressively integrate and consolidate IT applications and medical services of a target. However, without proper risk mitigation mechanisms, such integration projects are likely to threaten patient well-being. Instituting effective governance and controls around IT and service integration projects might enable them to achieve their financial metrics and maintain patient outcome quality.

Limitations, boundary conditions, and future research. One limitation of this study is that the empirical context of this study was the U.S. hospital industry. Whether the theory and findings of the study would be applicable to other hospital industries in other countries need to be examined in future research. Another limitation is that the study focused on MHS-to-hospital acquisitions. MHSs also acquire other healthcare entities such as physician groups, nursing homes, senior living homes, etc. Whether the theory and findings of this study would apply to non-hospital health entity acquisitions as well needs to be tested in future research. A third limitation is that this study focused on MHS-to-hospital acquisitions and excluded hospital-to-hospital acquisitions. Future research can test if the findings on MHS-hospital acquisitions would generalize to hospital-to-hospital acquisitions as well. Finally, there was a lack of longitudinal data on other measures of patient outcomes. While additional outcome measures were available for a few years, they were not available for all years in the timeframe of this study. We were able to use four patient outcome measures most of which were consistently available for all years of our study timeframe except for data on process measures which were not consistently provided after 2014. As additional patient outcome measures become available for longer periods of time, future research can seek to replicate our study with additional patient outcome measures.

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Appendix Table 1. Variables and data sources used to measure them

Dependent variables	**Data Sources**
Patient experience (PX), Clinical process quality (CP), All-cause readmission rates after discharge (RR), All-cause mortality rate (MR)	Hospital Quality Initiative Public Reporting - Hospital Care Compare and Provider Data Catalog
Independent variables	**Data Sources**
Hospital M&A transactions	Levin Associates & Healthcare Information and Management Systems Society (HIMSS) Analytics
IT Similarity	HIMSS' HAEntity Application Table
Medical Service Similarity	Center for Medicare Services (CMS), Provider of Service (POS) Files
Control variables	**Data Sources**
Concentration Rate in Target's CBSA Market (HHI)	HIMSS' AcuteInfo Table
Competitive Intensity in Target's CBSA Market	HIMSS' HAEntity Table
Target's Medicare Beds (%)	CMS-POS Files
Target's Service Scope (Tgt_ScpSer)	CMS-POS Files
MHS Acquirer's Service Scope (MHS_ScpSer)	HIMSS' HAEntity Table and CMS-POS Files
Target's Digitization Level (Tgt_DigiLvl)	HIMSS' HAEntity Application Table
MHS Acquirer's Digitization Level (MHS_DigiLvl)	HIMSS' HAEntity Application Table
Target's Cost-to-Charge Level (CCR)	Healthcare Cost Report Information System (HCRIS)

Appendix Table 2. Correlations and descriptive statistics

Appendix Table 2. Correlations and Descriptive Statistics

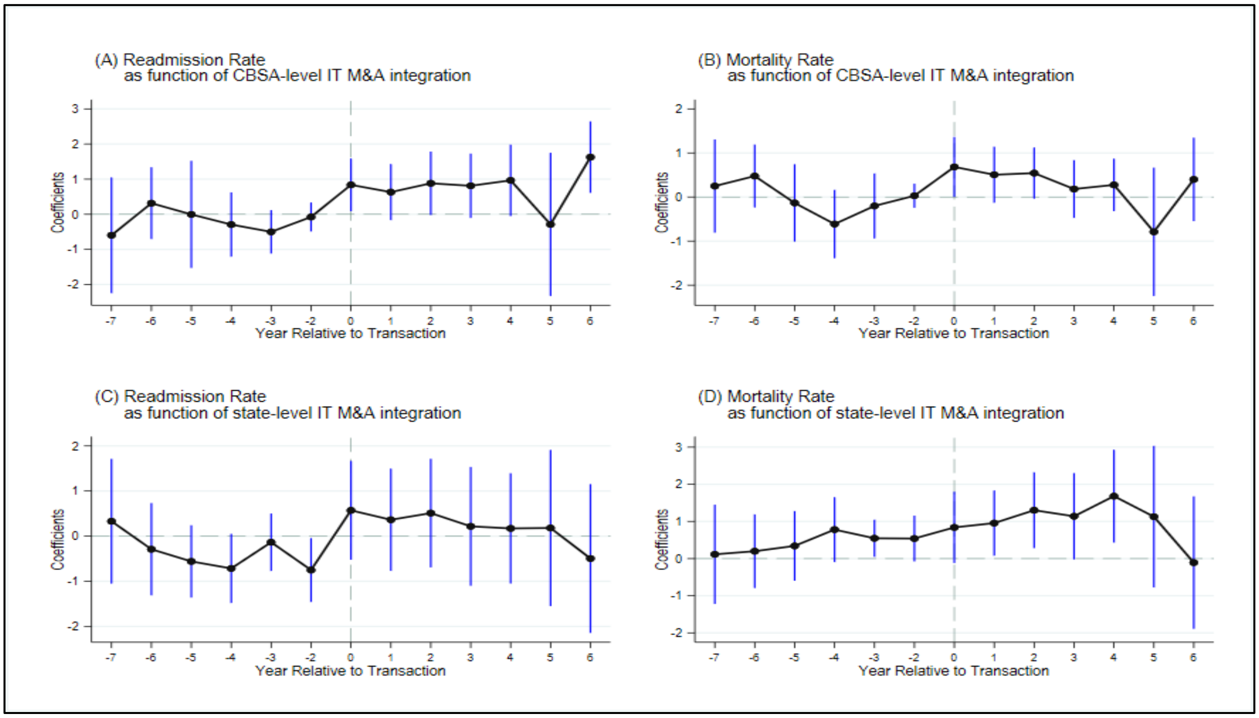
		N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	PX	3776	0.00	0.86	1.00																	
2	CP	2001	-0.01	0.58	0.14***	1.00																
3	RR	3880	20.19	2.72	-0.36***	-0.08***	1.00															
4	MR	3882	12.49	1.98	-0.05	0.09***	-0.22***	1.00														
5	PtITSim_CBSA	3024	0.30	0.35	0.06*	0.14***	-0.06**	-0.07**	1.00													
6	PtITSim_State	3024	0.15	0.26	0.03	0.04	-0.12***	0.11***	-0.43***	1.00												
7	PtITSim_National	3024	0.07	0.19	-0.04	-0.05	0.05*	0.03	-0.33***	-0.24***	1.00											
8	SerSim_CBSA	2974	0.21	0.23	0.06**	0.18***	-0.03	-0.09***	0.84***	-0.47***	-0.36***	1.00										
9	SerSim_State	2974	0.13	0.21	0.04	0.08***	-0.18***	0.15***	-0.44***	0.91***	-0.25***	-0.48***	1.00									
10	SerSim_National	2974	0.08	0.17	-0.02	-0.04	0.05	0.00	-0.42***	-0.32***	0.87***	-0.46***	-0.32***	1.00								
11	Concentration	3660	0.77	0.81	-0.11***	0.06*	0.00	0.05	0.02	0.03	0.01	0.01	0.03	-0.03	1.00							
12	CompetitiveIntensity	2999	21.64	39.41	0.09***	-0.27***	0.07**	-0.15***	0.05	-0.12***	-0.11***	0.08***	-0.14***	-0.09***	-0.25***	1.00						
13	MedicareBeds(%)	2974	0.97	0.09	-0.02	0.04	-0.01	-0.07**	0.06**	-0.02	0.04	0.07**	-0.03	-0.02	0.10***	0.03	1.00					
14	Tgt_ScpSer	2956	0.53	0.16	0.03	0.27***	-0.06*	-0.02	0.07**	-0.01	-0.01	0.18***	0.03	0.09***	-0.06*	-0.16***	-0.03	1.00				
15	MHS_ScpSer	2602	0.83	0.18	-0.03	0.15***	-0.07**	0.05	0.00	0.12***	0.24***	-0.02	0.12***	0.13***	-0.02	-0.12***	0.04	0.29***	1.00			
16	Tgt_DigiLvl	3024	0.63	0.18	0.12***	0.20***	-0.06*	-0.05*	0.12***	0.11***	0.17***	0.06*	0.04	0.06**	-0.05	-0.11***	0.04	0.21***	0.15***	1.00		
17	MHS_DigiLvl	3024	0.83	0.28	-0.03	0.10***	-0.11***	0.10***	0.24***	0.23***	0.19***	0.24***	0.24***	-0.16***	0.11***	-0.15***	0.13***	-0.04	0.41***	0.15***	1.00	
18	CCR	3335	0.28	0.13	0.17***	-0.12***	-0.00	-0.04	0.03	-0.06*	0.02	0.05*	-0.05*	0.03	-0.03	0.03	0.09***	0.05*	-0.16***	-0.01	-0.05*	1.00

Two-tailed test of significance: *p<0.10, **p<0.05, ***p<0.01.

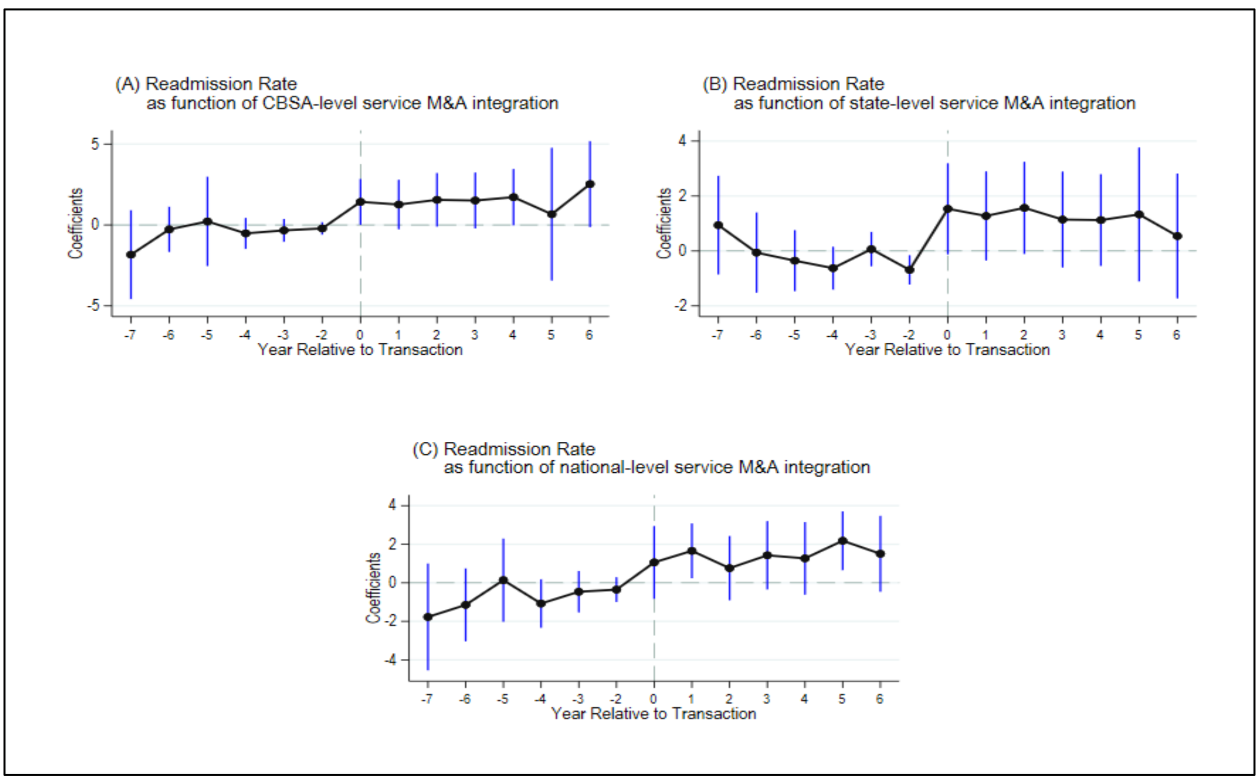
Appendix Table 3: Results of control variables for models in Table 1

Control Variables	(1) PX	(2) CP	(3) RR	(4) MR	(5) PX	(6) CP	(7) RR	(8) MR	(9) PX	(10) CP	(11) RR	(12) MR
Concentration	0.012	0.001	0.035	-0.039	0.010	0.002	0.036	-0.036	0.012	0.002	0.035	-0.038
	(0.022)	(0.013)	(0.053)	(0.038)	(0.026)	(0.014)	(0.053)	(0.037)	(0.025)	(0.014)	(0.051)	(0.038)
CompetitiveIntensity	-0.001	0.001	0.000	-0.006***	-0.001	0.001	0.000	-0.006***	-0.001	0.001	-0.000	-0.006***
	(0.001)	(0.003)	(0.003)	(0.002)	(0.001)	(0.003)	(0.004)	(0.002)	(0.001)	(0.003)	(0.003)	(0.002)
MHS_ScpSer	-0.369	0.207	-0.029	0.328	-0.364	0.201	0.004	0.330	-0.346	0.211	-0.106	0.357
	(0.268)	(0.276)	(0.744)	(0.470)	(0.271)	(0.281)	(0.754)	(0.464)	(0.270)	(0.272)	(0.778)	(0.461)
Tgt_ScpSer	-0.035	0.144	1.134***	-0.437	-0.030	0.149	1.183***	-0.430	-0.071	0.145	1.310***	-0.455
	(0.167)	(0.112)	(0.434)	(0.640)	(0.169)	(0.098)	(0.436)	(0.629)	(0.177)	(0.120)	(0.462)	(0.629)
MHS_DigiLvl	-0.145	-0.226*	1.031***	0.260	-0.169	-0.218	1.045***	0.308	-0.180	-0.222	1.174***	0.256
	(0.153)	(0.134)	(0.342)	(0.312)	(0.151)	(0.135)	(0.301)	(0.321)	(0.158)	(0.145)	(0.321)	(0.321)
Tgt_DigiLvl	0.247*	0.027	-0.185	0.304	0.224*	0.048	-0.147	0.357	0.231*	0.029	-0.134	0.301
	(0.133)	(0.106)	(0.354)	(0.275)	(0.128)	(0.110)	(0.365)	(0.287)	(0.132)	(0.106)	(0.372)	(0.284)
CCR	-0.682	-0.045	-0.916	-1.101	-0.703	-0.037	-0.867	-1.048	-0.706	-0.058	-0.863	-1.131
	(0.434)	(0.234)	(1.026)	(0.906)	(0.428)	(0.237)	(1.031)	(0.898)	(0.438)	(0.230)	(0.980)	(0.916)
MedicareBeds(%)	0.084	-0.227***	-0.650	-0.744	0.084	-0.233***	-0.695	-0.759	0.101	-0.230***	-0.731*	-0.742
	(0.325)	(0.059)	(0.441)	(0.616)	(0.328)	(0.059)	(0.440)	(0.632)	(0.326)	(0.058)	(0.414)	(0.624)
Constant	0.123	0.387	20.435***	13.304***	0.088	0.419	20.790***	13.476***	0.019	0.382	20.900***	13.240***
	(0.332)	(0.255)	(1.035)	(0.708)	(0.328)	(0.264)	(0.994)	(0.736)	(0.280)	(0.248)	(1.073)	(0.684)

Notes: Standard errors clustered at both MHS and State levels and presented in parentheses; p-values: *p<0.10, **p<0.05, ***p<0.01.



Appendix Figure 1. Dynamic effects of IT integration on patient outcomes



Appendix Figure 2. Dynamic effects of service integration on patient outcomes