Electronic Health Record Implementation: The Mediating Role of Workarounds on Resistance, Communication, and Perceived Implementation Success

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Purpose: In this presentation we share our latest research on the role coworker social influence and workarounds play in the implementation of electronic health records (EHR). This study relies on theories of organizational change and adaptive structuration theory to build and test an HIT workaround model. The findings suggest the workarounds are symbolic of a socially shared solution to overcome inadequacies in new EHR technology. While our study did not examine the impact on outcomes like patient safety, our findings challenge scholarship that depicts workarounds as stunting communication in organizations and resembling erratic, individually executed, quick fixes to immediate problems. The hypotheses constructing our model include:

H1: There is a direct positive relationship between informal social influence—comprised of coworker feedback and social support—and workarounds in healthcare organizations.

H2: There is a direct relationship between healthcare employees’ levels of workarounds in EHR use and their resistance to change, perception of implementation success, and perception of the quality of communication surrounding the implementation.

The primary objectives of this study are a) to discover how informal social interactions can act as undercurrents to change events, either obstructing or fostering psychological—perceptions of change success and change communication quality—and behavioral—employee resistance—outcomes; and b) to discover the consequences of workarounds on organizational change outcomes. In the next section, we discuss the study’s method.

Background and Rationale

The challenges that stem from organizational change initiatives, like the implementation of an EHR system, are complex. EHR systems can potentially have long-term benefits, but during implementation the process is time-consuming, disorienting, and occasionally disconcerting for employees. Scholars, practitioners, and consultants have long analyzed and debated the strategic dynamics of organizational change implementation and the critical role people and communication play in achieving successful change (Elving, 2005; Lewis & Russ, 2012; Smith, 2011). Today, organizational managers and employees must deal with the repercussions and learning curves that stem from increasingly frequent governmental mandates, technological advancements, growth in markets and competition, and rapid product turnover.

Healthcare organizations are especially feeling the tensions of all these changes as healthcare delivery has become increasingly dependent upon technology to computerize and document many aspects of patient care and patient-provider communication. This has propagated what some in the industry call an overdependence on technology (Tietze & McBride, 2015).
There are several implications of this top-down, far-reaching organizational change, and this study unearths some of these implications through an end-users perspective. Our approach shifts attention from the leaders of healthcare organizations to the front lines of healthcare. We emphasize the perspective of the people who implement these changes on the healthcare front line. Past research on organizational implementation and change has called for a stronger understanding of the informal acts of sensegiving and sensemaking that both inhibit and promote change initiatives (Lewis, 2011). Studying these acts is especially crucial in healthcare organizations given they are complex adaptive systems (Rouse, 2008) that strive to be highly reliable (Chassin & Loeb, 2013). This study contributes to organizational change, management, and healthcare communication literature by revealing the communication-constitutive nature of workarounds that materialize during organizational change. Workarounds are defined in this study as departures from an intended change design or implementation protocol. These behaviors are controversial—having been called both imperative and problematic for successful organizational change outcomes. We show how these acts are a product of coworkers collectively interacting with and shaping the change as it spreads throughout the organization. In addition, we emphasize the powerful mediating role of these workarounds in determining successful implementation outcomes and perceptions.

**Theoretical Guidance:** To better understand the impact of workers collectively reinventing parts of the EHR system and creating workarounds, we use Lewis’s work in planned organizational change (Lewis, 2000, 2007, 2011; Lewis & Russ, 2012), and adaptive structuration theory (DeSanctis & Poole, 1994; Poole & DeSanctis, 1990). We use these theories to build hypotheses that specify the social and behavioral antecedents of three outcomes variables: 1) resistance to EHR implementation, 2) perceptions of change success, and 3) perceptions of communication quality surrounding EHR change. We then highlight the theoretical and practical contributions of the constructed model for scholars and managers, emphasizing the pivotal role workarounds and coworker social influence play in the organizational change processes.

**Method and Analysis**

We collected data from a healthcare network in the Southwest region of the U.S., which we call GreatCare Health Network. This healthcare network is a nonprofit federally qualified health center that delivers medical and behavioral services to the underprivileged citizens in the surrounding county. Greatcare Health Network is composed of approximately 500 employees and provides a laundry list of services to the less fortunate individuals in its surrounding community including comprehensive primary medical care and 24 hour emergency on-call service. GreatCare is currently using the EHR vendor EpicCare, which is one of the most widespread EHR providers in the US (Kane & Chesanow, 2014). The final sample size consisted of 345 healthcare employees recruited using a criterion and voluntary sampling method.

We used a pen and paper strategy and distributed our survey to employees in an organization-wide meeting in 2014. We also distributed two rounds of paper surveys via USPS to physicians who worked for Greatcare to encourage their participation. Participants were given three weeks to return paper questionnaires to the researchers or a Greatcare office secretary. To encourage survey returns and participation, email reminders were sent to Greatcare employees at strategic points in time when employees were most likely to scan their inbox—like payday
because Greatcare sends email verification when money is deposited into employees’ accounts. Out of the 310 distributed surveys, 219 were returned, which amounted to a 71% response rate.

Structural equation modeling with Maximum Likelihood estimation was used to analyze the hypothesized effects of two latent constructs—coworker/informal social influence and workarounds—on three dependent observed variables—employee resistance, perceived success of the technological change, and finally perceived quality of communication surrounding the implementation. Missing data comprised less than one percent of the dataset, and the variable means were imputed using mean substitution to retain these cases.

After the model was specified, identified, and estimated, it was tested for model fit. In evaluating our model, we were predominantly concerned with the indices of model fit, path coefficients, and standard errors (Kline, 2010). Specifically, we used the chi square test, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) to assess model fit. Scholars recommend assessing an assortment of model fit indices to ensure a well-fitting model is not discarded or, vice versa, an ill-fitting model is retained (Kline, 2010).

**Results and Discussion of Findings**

Hypothesis one and two were assessed using SEM analyses. The initial model, which included all of the variable paths that were listed in each of the abovementioned hypotheses, revealed a model that fit the data well: \( \chi^2 (13) = 51.31, p < .01, \frac{\chi^2}{df} = 3.9, \text{CFI} = .96, \text{TLI} = .95, \text{SRMR} = .03, \text{RMSEA} = .09. \) Inspection of the path estimates revealed strong to very strong path estimates—all of which were statistically significant at the \( p \leq .001 \) level (see Figure 1).

While the initial model was acceptable, the modification indices suggested the model could better capture the observed data. Adding two paths in the model achieved this. Using the Lagrange Multiplier test (LM) we improved the overall model fit. Like model building, trimming must also be theoretically defensible, and we were judicious in our quest to not make a large number of arbitrary changes to the model (Kline, 2010). The improved version of the initial model demonstrated outstanding fit: \( \chi^2 = 23.26 (11), p > .01, \frac{\chi^2}{df} = 2.1, \text{CFI} = .99, \text{TLI} = .97, \text{SRMR} = .02, \text{RMSEA} = .06. \) Moreover, all estimates were again significant (see Figure 2 for a visual depiction of the modified model). As demonstrated in Figure 2, two direct paths between social influence and a) resistance and b) perceived change success were added to the model. Table 1 shows the direct and indirect effects of the latent variables on the outcomes.

**Contributions and Practical Results**

The findings represent important contributions to healthcare organizational change research. Much of the literature in healthcare and medical informatics fields equates the workaround with negative consequences, such as reduced reliability of systems and increased
patient safety issues (Halbesleben, Wakefield, & Wakefield, 2008; Tucker, 2009). That may be
the case with certain types of workarounds; however, this study suggests some positive outcomes
workarounds can have on the psychological outlook of employees during organizational change.
Consequently, this research yields pragmatic implications for managers and healthcare officials
who are currently attempting to implement new technology systems, yet are affronted with
difficulty from employees (see McGinn et al., 2011). Furthermore, this study extends adaptive
structuration theory by demonstrating that, in addition to their practical advantages,
technological workarounds are cognitively influential as they enhance employees’ perceptions
of organizational communication and the implementation process. In the next few paragraphs, we
elaborate on these findings and how they contribute to current health and organizational
communication literature.

The success of technological change in healthcare organizations appears to be contingent
upon micro-social contexts, human agency—as compared to universally reacting to
environmental stimuli, and to a certain degree, identification through action, experimentation,
and internalization (Goh, Gao, & Agarwal, 2011; Rooney, et al., 2010). This observation stems
from the mediating role workarounds played in this research, which was at the core of our
findings. Coworker social influence had a significant positive direct effect on employee
resistance ($\beta = .45$) and a significant negative direct effect on perceptions of changes success ($\beta
= -.45$). However, the direction of these relationships inverts when the workaround is introduced
as a mediating variable. This is further evidenced in assessing the direct and indirect effects of
social influence in the model. (See Table 1)

Our systematic empirical investigation revealed coworker social influence had negative
implications for implementation efforts. However, when re-directed through workarounds,
employees’ perceived implementation success and perceived change communication quality
significantly increased and measurements of employee resistance significantly decreased. These
findings substantiate previous arguments that the act of customizing, or reinventing, a technology
increases its acceptance in localized settings (Rogers, 1995). Mandated technological change—
such as EHR implementation—in which the government is largely depicted as the change agent
can perceptively take the form of a battle between standardization and individualization. In other
words, the government is seeking to standardize healthcare information, but this simultaneously
strips physicians and other health officials of their distinctive, enduring methods of recording
patient information that are often meticulously built overtime. To relinquish levels of resistance,
health professionals—physicians in particular—must be able to put their local stamp of approval
on these standardized frameworks, thus branding them with a discriminating organizational
identity. In order to be approved and normalized, technologies must be individualized by being
re-interpreted in the hands of practicing health professionals, even if only minutely. This allows
employees to identify with the new technology and engage in both intellectual and hands-on
sensemaking (Jensen, Kjaergaard, & Svejvig, 2009). Creswell and Sheikh (2013) suggest that
managers must allow, and even encourage, workarounds to become official organizational
strategies or technology may never fulfill its potential. This is evidenced by our findings that
EHR technology workarounds had positive effects on perceptions of the EHR technology’s
relative advantage and EHR implementation success.

*Note: This presentation is based on a paper currently under review.*
References


Table 1

*Direct and Indirect Effects of Latent Variables in Modified Model*

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Figure 1. The Initial HIT Workaround Model with Standardized Estimates
Figure 2: The Revised HIT Workaround Model