Apparatures of Knowledge Delivery to Patients: The Role of Social Media in Vaccine Controversies

Research-in-Progress

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Abstract

The practice of knowledge delivery to patients has long been performed by healthcare professionals, who were seen as trustable sources of healthcare knowledge. However, healthcare knowledge is now being distributed widely online and in particular on social media, by numerous individuals who are sharing a mixture of scientific/non-scientific information grounded in personal perspectives and experiences. In the shift to healthcare knowledge delivery on social media, traditional practices of knowledge delivery to patients are challenged. This study draws on material-discursive practices, known as apparatures, to examine two notable material-discursive practices in vaccine administration. This research is expected to make two contributions to the IS literature. First, it aims to identify significant differences in the two knowledge delivery practices and their outcomes. Second, it aims to investigate the ongoing interaction and tension between traditional and new knowledge delivery approaches. We provide preliminary insights and a roadmap for further developing this research.

Keywords: Social media, Healthcare Information Systems, Knowledge sharing
Introduction

The practice of knowledge delivery to patients is one of the most important aspects of health care. Healthcare professionals are continuously in the process of providing knowledge to their patients to inform them about their health conditions and help them make informed decisions (Baker et al. 2002; Jordan et al. 2010). Knowledge delivery to patients has been traditionally made by healthcare professionals who remained the best source of credible healthcare knowledge. However, with the extensive use of social media in recent years, patients have easy and wide access to several globally dispersed resources such as opposing medical beliefs, scientific and non-scientific evidence, and emotionally arousing stories of other patients to obtain healthcare knowledge (Kata 2012).

In the shift to medical information delivery on social media, traditional practices of knowledge delivery to patients are challenged as patients can even be influenced by misinformation made available through social media. For patients, knowledge delivery, education about their health conditions, and explanations with regards to the consequences of their decisions on their health have typically been provided by healthcare professionals who were drawing on professional knowledge, field experience, and patient’s medical history. However, healthcare knowledge is now being distributed widely online and in particular, on social media, by a large number of anonymous, non-professional individuals who are sharing informal information and a mixture of scientific/non-scientific evidence grounded in personal perspectives and experiences. Such mixture of information raises controversies - for example regarding the way knowledge is constructed in this domain, the people who hold this knowledge, and the way this knowledge is being delivered. Hence, scrutinizing the role of IT (here social media) to understand how IT changes the established ways of knowledge delivery and to identify the consequences of such changes becomes significant. One contribution of this paper is to shed light on the specific everyday activities that constitute traditional and social media-based knowledge delivery practices and on the outcomes generated as a result. Using a material-discursive conceptualization of knowledge delivery, we aim at showing how knowledge delivery is materialized in certain ways and what its performative consequences are. In addition, using material-discursive practices as our theoretical lens allows us to focus on the constitutive entanglements of humans and technologies (Orlikowski et al. 2013).

While there has been considerable research interest in knowledge delivery to patients by physicians and its underlying mechanisms (Baker et al. 2002; Coulter et al. 2007; Ishikawa et al. 2008; Jordan et al. 2010), we currently know little about what happens as healthcare knowledge delivery moves to social media. In this study, we aim to address this gap by conducting a qualitative study on knowledge delivery that focuses on vaccination. We address two main research questions: “How does the use of social media change the practices of knowledge delivery to patients?” and “How do traditional and social media-based knowledge delivery approaches influence each other?” To answer these questions, we will investigate two notable vaccine administration positions in the public health domain. First, we will study the vaccine administration guidelines provided by Centers for Disease Control and Prevention (CDC), which is based on professional standards for medication, approved clinical trials, and jurisdictional policies and procedures. Second, we will look into Facebook pages on (anti)vaccination, which are based on informal content, and a mixture of scientific and non-scientific evidence.

This research will allow the identification of important differences in the knowledge delivery processes and in the outcomes discussed in the extant literature. More importantly, our study will allow uncovering how these two knowledge delivery approaches influence each other. As more people use social media (i.e. Facebook) to share information about vaccine administration, an increasing number of people are joining anti-vaccination movement questioning the legitimacy of what has been known as science and/or scientific organizations (Kata 2012; Larson et al. 2011). Since a small but increasing number of people refuse to vaccinate their children, several infectious diseases can spread at higher rates such as the Disneyland measles outbreak (Majumder et al. 2015). Hence, healthcare organizations are confronting the anti-vaccine movement by providing recommendations, guidelines, and policies to encourage vaccination (Betsch et al. 2012). All in all, this study aims to investigate the ongoing interaction and tension between traditional and new, social media-based, knowledge delivery approaches.

This research is expected to make two contributions to the IS literature. First, we aim to provide a grounded understanding of the practices of knowledge delivery to patients by empirically investigating these practices and their outcomes. We believe knowledge delivery to patients on social media goes
beyond the expansion of the diversity of the traditional and standardized knowledge delivery practices. Social media can provide equal opportunity to all perspectives and allow outlier and small extremist views the same space as scientifically approved ones (Larson et al. 2011). Second, this research draws on material-discursive practices (Barad 2007; Orlikowski et al. 2013) and will study the materiality of knowledge delivery practices, demonstrating how knowledge delivery is produced from different patterns dispersed across different entanglements of spaces and times (Barad 2007). Material-discursive practices, also known as apparatuses, are not passive observing instruments, but rather are productive of and part of the phenomenon themselves. Prior work (Orlikowski et al. 2013), already has shown that how the ongoing production of material-discursive practices or apparatuses can reconfigure the processes and outcomes of the practices in organizations. However, this study aims to go one step further and examine how two different, yet related, apparatuses or material-discursive practices (traditional and social media-based knowledge delivery) influence each other.

We start by providing theoretical background on material-discursive practices. Next, we conduct a literature review on knowledge delivery practices by healthcare professionals and on social media, focusing on main prior findings that are relevant to this study. Our review reveals how discursive materiality has been significantly absent in the studies of knowledge delivery to patients. Next, we present our proposed methodology and empirical context (vaccine administration, in which we consider two apparatuses of knowledge delivery). Based on the data collected at this point, we then provide preliminary insights on how they can influence each other. Finally, we conclude by providing a roadmap for further developing this research and highlight the expected contributions of this research.

Theoretical Underpinnings

Material-discursive practices defined as “specific iterative enactments—agential intra-actions—through which matter is differentially engaged and articulated” (Orr 2006) highlight how meaning and matter are entangled in that meaning is not a property of individual words, rather it is through particular agential intra-actions that the properties of the “components” of phenomena become determinate and that particular embodied concepts become meaningful. Thus there is no predefined reality to be interpreted. In material-discursive view of the phenomenon, no priority is given to either materiality or discursivity as there is no causal relationship between the two, but rather an iterative materialization.

Although there are separations among different phenomena, each phenomenon and our interpretations of it are inseparable and are contingent on their relations within material-discursive practices (Orlikowski et al. 2013). Material-discursive practices have also been referred as apparatuses (Barad 2007). The notion of apparatus underlines the inseparability of the device from what is observed. Apparatuses are productive and part of the phenomenon as they enact what matters and what is excluded from mattering (i.e. agential cuts). Considering knowledge delivery as material-discursive practices or apparatuses enable us to depart from viewing specific activities, text, and artifacts as the means to transfer knowledge, and study how knowledge delivery practices are being materialized within specific forms (e.g. activities, text, and artifacts).

Adopting material-discursive practices as our theoretical lens allows an in-depth study of traditional and social media-based knowledge delivery practices. Indeed, apparatuses are constituted through specific material-discursive practices, their agential cuts, and their performative outcomes. Using this theoretical lens, we can investigate whether the knowledge and content transmitted in the two practices are the same, whether knowledge delivery to patients is a one-way process (i.e. suggesting patients as passive recipients of knowledge) or whether the intended recipients are patients speaking and making decisions on their behalf. Moreover, we will explore yet another interesting question that remains unanswered in the material-discursive view; that is how different apparatuses influence each other.

Our overall goal is to add to this body of literature by conducting a qualitative study regarding vaccine administration, where the practices of knowledge delivery and peer interactions on social media have created distrust in the credibility of the medical organizations and traditional knowledge delivery practices. In this research, we propose that not only the agential cuts of knowledge delivery to patients are different in traditional and social media-based settings, but also that they influence each other via their performative outcomes. For example, when healthcare officials became aware of the consequences of misinformation on social media that lead a group of people to refuse vaccinating their children, they
enacted a legislation to mandate vaccine administration for every child who attends school. On the other side, anti-vaccine communities have started to protest against this new law. Although the anti-vaccine movement predates the universal use of social media (Kata 2012), social media has a significant role in disseminating the anti-vaccine views to a larger group of people and enables anti-vaccine activists to interact remotely, make collective decisions, and organize protests. This study will allow us first, to understand how knowledge delivery is being conducted in traditional and social media-based environments and second, to investigate how they create tensions and how they influence each other via their performative outcomes.

**Literature Review**

**Physician-Patient Relationship**

Education of patients by physicians has been studied extensively from two different perspectives. One perspective focuses on physicians in improving their abilities to understand patient histories and concerns, and inform patients about their conditions and treatment requirements to achieve successful diagnosis. Several studies have been conducted in this regard, looking at education agenda and levels, patient participation, privacy and reliability concerns, social and cultural barriers (Roter et al. 2001), and educational materials (Badarudeen et al. 2010). The latter is particularly relevant to this study.

A second perspective focuses on the contractual relationships and conflicting interests between patients and physicians. After the 80s, patients had access to more online/offline educational resources. In fact, they have become more knowledgeable and have challenged physicians’ medical authority (Emanuel et al. 1995). Traditionally, physicians informed their patients about their illnesses and treatments only as much as they assessed is sufficient for the patients. However, physician-patient relationship has rapidly moved away from a paternalistic approach to patients and toward focusing on patient autonomy and authority over their health conditions. A remarkable example is the anti-vaccine movement where several sources of non-scientific information about the adverse effects of vaccines are socially constructed. As a result, some parents question the validity of physicians’ knowledge by refusing to take their children for vaccination. Such movements are said to have contributed to a significant increase in preventable diseases including measles, putting lives of many in danger (Gangarosa et al. 1998).

**Traditional Knowledge Delivery Practices**

Good communication with patients is the cornerstone of effective patient education. From obtaining the patient’s medical history to conveying a treatment plan, the healthcare professional relationship with patients is built on effective communication and education. In these encounters, both verbal and nonverbal forms of communication constitute this essential feature of medical practice. Previous work has proposed different methods for informing patients such as paper-based healthcare packages, computer and internet-based data, and mass media (Coulter et al. 2007). Different verbal and non-verbal materials are used to produce knowledge and educate patients such as verbal explanations, hand-written materials, printed materials, multimedia (CDs and DVDs), and more recently, the Internet (Travaline et al. 2009). As nearly all healthcare professionals use verbal explanations to educate their patients, there are several guidelines for this practice such as assessing of what patient already knows, providing information in a slow and deliberate fashion to allow the time needed for patients to comprehend the new information, providing short, clear, and simple explanations, telling the truth, and using appropriate body language while talking to patients (Badarudeen et al. 2010; Orr 2006).

Creating patient education materials by healthcare professionals follows established guidelines and assessment tools to evaluate the readability (e.g. SMOG, Lexile) and comprehensibility (e.g. SAM, SAM-CAM, and Health Literacy INDEX) of the materials. In knowledge production for patients, quality is more important than quantity since understandable and actionable information has become recognized as an important aim of patient education materials. Furthermore, patient education materials are actionable when patients with diverse backgrounds and varying levels of health literacy can identify what they can do based on the information presented (Badarudeen et al. 2010). Established development approaches to produce patient education materials include different steps such as reviewing existing materials to identify relevant constructs and determining the understandability of the materials. Overall, established
development approaches enable healthcare professionals to effectively focus on the understandability and actionability of the education materials for patients (Davis et al. 1990).

Written (hand-written or printed) health information (i.e. doctors’ notes or pamphlets) has important functions. Giving patients and caretakers written information is vital in reinforcing verbal communication (Coulter et al. 2007). In an attempt to contain healthcare costs, patients and their caregivers are being given more responsibility in their disease management, making the role of patient education including written information even more critical. Providing health education through written materials is a time-tested method. Readability, an important attribute of written material, can affect the reader’s ability to comprehend. Several healthcare organizations have recommended readability of patient education materials should not be higher than sixth- to eighth-grade level. However, most of the available patient education materials are written at a reading level that does not meet these standards and may be too complex for comprehension by a substantial proportion of the population (Davis et al. 1990).

**Knowledge Delivery Practices on Social Media**

With social media, knowledge collaboration occurs among anonymous individuals with different backgrounds and interests. Knowledge collaboration embeds the sharing, transfer, accumulation, transformation, and co-creation of knowledge by individuals. Knowledge collaboration is a key factor in the life of social media as shared knowledge can benefit individuals alone or add to community’s greater value (Wasko et al. 2005; Yates et al. 2011). For example, the Mayo Clinic Center for Social Media aims at engaging hospital, healthcare professionals and patients to collaborate through social media to improve global health. Similarly, “Patientslikeeme” is a health related platform that enables information sharing and aims at transforming the way patients manage their own conditions, changing the way industry conducts research, and improving patient care. There are however, potential risks in knowledge sharing on social media. For example, when individuals with vague social identities share partial information about their medical experiences, they are not always accountable for their actions (Johnson 2001). Moreover, individuals may not share common interests, or even have competing interests, when they are sharing knowledge on the same forum. The lack of availability of information for triangulation is another area of vulnerability for knowledge collaboration in social media (Fox 2011).

While social media provide a useful platform for interaction and communication where existing information can be re-used, modified and added to growing bodies of crowd-sourced knowledge, this platform blurs the lines between the consumption and production of knowledge (Betsch et al. 2012). Medical knowledge was previously bound to standardized guidelines and approved medical trials by the scientific community. Now, the Internet and social media enable wide access to the mixture of scientific and non-scientific information, where people can be exposed to and influenced by misinformation. Substantial misinformation is broadly available on social media, which makes it difficult for individuals to distinguish knowledge from misinformation. Related to this study is the misinformation about vaccination and its association with autism (Kata 2012), which we discuss further in the next section.

**Context of the Study**

Vaccines are often known as a significant public health intervention, contributing to dramatic decline in morbidity and mortality rates from infectious diseases (Kata 2012). Nonetheless, ever since their introduction, there were skeptics who worried about the unknown risks of vaccination. While questioning vaccine safety is not new, the anti-vaccine movement has been going stronger since the premier British medical journal, the Lancet, published a study in 1998 linking a common vaccine (i.e. MMR) to autism. As several subsequent peer-reviewed studies have failed to show any association between the vaccine and autism, the journal retracted the study and its author was later barred from practicing medicine due to deliberate falsification in his research. Nonetheless, the notion of a vaccine-autism connection has been endorsed by celebrities and reinforced on media and in online spaces. The availability of numerous scientific and non-scientific online materials on vaccine controversies, peer communications on social media, and individual interpretations, has had a substantial effect on the decrease in the public confidence in vaccination (Larson et al., 2011). Doubting science however has some consequences. Some governments are cutting benefits for families who refuse to vaccinate their children. In some cases, non-vaccinated children cannot register at schools and day-care centres, as they are considered to put others’ health at risk.
Methodology

For the purpose of this study, we adopt a grounded theory approach (Glaser et al. 2009; Strauss et al. 1990) to fully comprehend how knowledge delivery apparatuses are constituted through specific material-discursive practices, what their performative outcomes are, and how the apparatuses influence each other. As we pursue our data collection and analysis, we will also remain alert to emerging ideas. As this is an exploratory study, inductive and iterative data analysis will be used (Patton 1990) where a systematic examination of similarities between various categories will be conducted to develop the concepts of material-discursive practices. We will collect our data on two vaccine administration perspectives. First, we will examine extant literature and established guidelines for vaccine administration by the Centres for Disease Control and Prevention (CDC), which is the leading national public health institute of the United States. Second, we will collect data from public (anti)vaccination pages on Facebook, such as “Californians for Vaccine Choice” and “Dr. Tenpenny on Vaccines”, where several people communicate and publicly share their knowledge with others regarding the risks of vaccines, especially for young children, and regarding the freedom of choice to opt-out from vaccination. From an IS perspective, we will conduct our analysis to elaborate on how the particular technological configurations deployed in traditional and social media-based knowledge delivery practices might influence the controversies that are played out. For instance, we will explore who is able to present information, what is the format of the information, and how the information is presented. Through our analysis, we will also consider how the nature of the controversies, which predate Facebook and, in some cases, the Internet, may have been influenced by the particular forms of the IT involved.

As this is a research-in-progress, in the paragraphs below, we present very preliminary findings based on the data that were collected at this point in time, and we reflect on the insights they suggest.

**CDC Knowledge Delivery Practices**

The CDC aims to protect public health and safety by controlling and preventing disease, injury, and disability. It offers guidelines, publications, vaccine schedules, and educational activities designed to improve the health of the United States citizens. For instance, the CDC offers healthcare professionals different communication strategies for successful vaccine conversations with parents and caregivers:

“If parents raise other possible hypotheses linking vaccines to autism, four items are key: (1) patient and empathetic reassurance that you understand that their infant’s health is their top priority, and it also is your top priority, so putting children at risk of vaccine-preventable diseases without scientific evidence of a link between vaccines and autism is a risk you are not willing to take; (2) your knowledge that the onset of regressive autism symptoms often coincides with the timing of vaccines but is not caused by vaccines; (3) your personal and professional opinion that vaccines are very safe; and (4) your reminder that vaccine-preventable diseases, which may cause serious complications and even death, remain a threat.” The CDC’ website: Talking with Parents about Vaccines for Infants, Strategies for Health Care Professionals

Moreover, the CDC provides several immunization educational materials, such as flyers intended to complement personal education and advice from healthcare professionals to patients. The CDC requires healthcare professionals to print and to provide Vaccine Information Statements (VIS) to patients when vaccinations are given:

“A vaccine, like any medicine, is capable of causing serious problems, such as severe allergic reactions. The risk of MMR vaccine causing serious harm, or death, is extremely small. Getting MMR vaccine is much safer than getting measles, mumps or rubella. Most people who get MMR vaccine do not have any serious problems with it.” The CDC website: Information for Parents.

The CDC not only provides immunization guidelines for healthcare professionals, but also for the public:

“Visitors to our country and unvaccinated U.S. travelers returning from other countries can unknowingly bring (import) measles into the United States. Since the virus is highly contagious, such imported cases can quickly spread, causing outbreaks or epidemics among unvaccinated people and under-vaccinated communities. To protect your children, yourself, and others in the community, it is important to be vaccinated against measles. You may think your chance of
getting measles is small, but the disease still exists, and anyone who is not protected is at risk of getting the disease in the United States and while traveling internationally.” The CDC website: Measles - Q&A about Disease & Vaccine.

**Facebook Knowledge Delivery Practices**

The “Californians for Vaccine Choice” and “Dr. Tenpenny on Vaccines” Facebook community pages are currently two of the most visible and active spaces for hosting online communications on vaccine safety issues aiming to inform people about the risks of vaccines and to stop mandated vaccinations. In contrast to the CDC website, these pages are not focused on providing vaccine administration guidelines or supporting the government’s public immunization program. Instead, they mostly rely on peer contributions and materials on vaccine safety, or lack thereof. Several individual posts include not only emotional anecdotes, but also assertions that their arguments are supported by scientific evidence:

“What makes Big Pharma any less guilty than those Nazis put to death by the Nuremberg trials? A published report acknowledged that MMR-Autism figures are completely bogus to scare the public and sell more vaccines.” A post on Facebook page: Californians for Vaccine Choice.

“Vaccine choice is a fundamental human right.” No truer words. 54% of children are suffering a chronic illness or are disabled, yet we push forced vaccination like its water.” A post on Facebook page: Dr. Tenpenny on Vaccines.

However, not all the online communicators on these pages follow the same goal of refusing vaccination. Some posts actually support vaccination. An interesting observation is that both pro and anti-vaccine posts claim to have scientific support for their arguments:

“How much do I love my kids? I love my kids so much that I listen to my pediatrician. I love them so much that I have done real research versus reading blogs. I love my kids so much that I don’t put my agenda before the health of my children and the health of my community. I love them so much I vaccinated them and they are 100% healthy.” A post on Facebook page: Dr. Tenpenny on Vaccines.

What is interesting and special about social media and online knowledge delivery practices is that they enable people to easily access a very large amount of information on almost everything. Information overload creates confusion and controversy as people often have difficulty scrutinizing all the available information and properly distinguishing information from misinformation:

“Looks like a case of “if you can't prove something, overwhelm everyone with too much data”. There is no possible way that I could ever search through all that vaccine information, and I’d bet a pretty large sum of you haven’t (and won't) either.” A post on Facebook page: Dr. Tenpenny on Vaccines.

**The Influence of Apparatuses on Each Other**

Traditional knowledge delivery practices offer a model of parental relationship between physician and patient, where patients have high degree of trust in their physicians. In addition, patients here are mainly considered as passive recipients of knowledge, with limited authority to disagree with their physicians. In contrast, publicly sharing anti-vaccine viewpoints on Facebook have performative outcomes that not only can influence traditional knowledge delivery practices, but also their performative outcomes. For example, in recent years, the increasing use of social media have fueled anti-vaccine movement, as social media enable people to easily find others with the same views and to shape a community. Such community can then enable collective actions and oppositions to the CDC and federal policies that promote vaccination, which in turn triggers actions and reaction from governments and the CDC.

On the one hand, while community shaping is one outcome of people interacting on social media, losing trust in physicians and in health policy makers might be a more serious consequence. Indeed, many people now refuse to vaccinate their children as they lose trust in the CDC and in public health officials. They accuse the CDC and public health officials of not presenting the truth about vaccination risks in order to make more money:
“The fact that no action has been taken to get Dr. Thompson to testify makes me doubt that neither Congress nor the CDC have any interest in holding people accountable or finding out the truth. Here’s a great opportunity to increase much-needed trust in vaccines and the government agencies in charge of them but instead they appear to hope that this story gets buried and people will forget about it.” A post on Facebook page: Californians for Vaccine Choice.

“These bills are about money. Big Pharma can charge whatever they want for these vaccines. It’s certainly not really about children or public safety.” A post on Facebook page: Californians for Vaccine Choice.

On the other hand, the CDC and its powerful collaborators, including the Senate Judiciary Committee, are trying to control the public health and enforce vaccination by introducing bills such as SB 277 that would eliminate the exemption from immunization based upon personal beliefs, and require schools to not to admit children unless they show proof of immunization against some communicable diseases. Moreover, the CDC provides several educational materials that aim at demonstrating vaccine safety to the public.

“One vaccine ingredient that has been studied specifically is thimerosal, a mercury-based preservative used to prevent contamination of multidose vials of vaccines. Research shows that thimerosal does not cause Autism Spectrum Disorder (ASD). In fact, a 2004 scientific review by the IOM concluded that "the evidence favors rejection of a causal relationship between thimerosal–containing vaccines and autism." Since 2003, there have been nine CDC-funded or conducted studies that have found no link between thimerosal–containing vaccines and ASD, as well as no link between the measles, mumps, and rubella (MMR) vaccine and ASD in children.” The CDC website: Vaccines Do Not Cause Autism.

**Conclusion and Future Steps**

To date, social media has been studied as a platform for knowledge collaboration and crowd-sourced knowledge. However, with the proliferation of knowledge and the spread of different viewpoints on social media, come doubts. When scientific knowledge from moon landing to vaccine safety faces organized and often furious opposition empowered by non-scientific interpretations of research or misinterpretations of correlation as causality, doubters declare war on the consensus of scientific knowledge (e.g. moon landing conspiracy theories and vaccine controversies). People often encounter contrasting sources of knowledge, which makes distinguishing knowledge from misinformation a complicated and sometimes unnerving task. As a result, people face uncertainties, risks, and fears they cannot easily analyze.

Drawing upon material-discursive practices, our aim is to contribute to the extant IS literature by explaining how different apparatuses of knowledge delivery have different performativity and outcomes. As our preliminary data showed, traditional and social media-based knowledge delivery practices are not only configured differently, but also generate significantly different knowledge on vaccine administration. Over several years of scientific work, medical experience, and ongoing improvements the CDC has provided standardized guidelines for vaccine administration to prevent epidemics of many preventable diseases and to improve public health. As the CDC is institutionalized within the United States Department of Health and Human Services, healthcare professionals are trained and required to use the CDC guidelines to inform their patients about vaccination. In contrast, knowledge delivery on Facebook pages is made possible through sharing personal opinions, patients’ experiences, and a mixture of scientific and non-scientific evidence. While the existence of vaccine skeptics is not new, the anti-vaccine movement has gained momentum with the arrival of online communities on Facebook. Many people on Facebook pages are accusing healthcare professionals in general and the CDC in particular of disseminating false knowledge about the vaccine safety.

Future steps for this study include collecting and analyzing further data from 1) extant literature and established guidelines for vaccine administration on how formal knowledge delivery practices are conducted, and 2) public Facebook pages on (anti)vaccination movement. Using an inductive approach, this research not only aims to study how traditional and social media-based knowledge delivery practices are different, but also to uncover the ongoing interaction and tension between them. Until now, the extant IS literature has shown how material-discursive practices or apparatuses of valuation are actively produced (Orlikowski et al. 2013). We expect our study to contribute to this line of research not only by providing a grounded understanding of apparatuses of knowledge delivery to patients, but more
importantly, by uncovering how these apparatuses influence and create tensions for each other. Studying material-discursive practices leads us to examine knowledge delivery practices not as a series of instructions given by healthcare professionals to patients, but as materially constructed within people, things, actions, texts, spaces and times. To study knowledge delivery practices as dematerialized is to ignore the large network of connected people, information, opinions, things, and experiences. It is a critical point to consider as the apparatuses give order to the online crowd and are consequential for the public health. Although the notion of interaction between apparatuses has been discussed in agential realism perspective (Barad 2007), IS literature has yet to address this interaction and its outcomes for organizations.

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